CITGO FACILITY
I.1: REMOVAL ACTION
CORRESPONDENCE GENERAL

IN-

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11-7-97

CITGO PETROLEUM CORPORATION
ARLINGTON HEIGHTS, ILLINOIS

SITE INVESTIGATION REPORT

CITGO EAST CHICAGO TERMINAL
2500 EAST CHICAGO AVENUE
EAST CHICAGO, IN 46312

PROJECT NO. 1195

Natural
Resource
Technology

N R T

Natural
Resource
Technology, Inc.

N R T

SITE INVESTIGATION REPORT

CITGO EAST CHICAGO TERMINAL
2500 EAST CHICAGO AVENUE
EAST CHICAGO, INDIANA

Project No. 1195

Prepared For:

CITGO Petroleum Corporation
2316 Terminal Drive
Arlington Heights, IL 60065

Prepared By:

Natural Resource Technology, Inc.
23713 W. Paul Road, Unit D
Pewaukee, WI 53072

November 7, 1997

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EXECUTIVE SUMMARY

Natural Resource Technology, Inc. (NRT) was retained by CITGO Petroleum Corporation (CITGO) to perform a site investigation at Dikeyard 4 of the CITGO Terminal facility located at 2500 East Chicago Avenue (State Highway 312) in East Chicago, Indiana. The investigation was conducted in response to an on-site release of turbine fuel discovered on May 14, 1996 from the fill and transfer fuel piping near Tank #4 and along the adjacent right-of-way (ROW) to the south. The suspected fill line was taken out-of-service and replaced with a new fill line. CITGO excavated and dewatered a portion of the spill area to aid in the identification and repair of the fill line. CITGO reported the release to the Indiana Department of Environmental Management (IDEM) Emergency Response on May 14, 1996. The release was reported as less than 100 gallons of turbine fuel and contained on the CITGO site. IDEM stated to NRT on September 24, 1996 that a written response to the release notification will not be provided to CITGO as the IDEM considers this release to be a minor incident based on the volume of the release (less than 100 gallons) and since a release to off-site property was not reported. IDEM release number 9605119 was assigned to the site.

The objectives of the site investigation were to determine the presence or absence of free-phase product (turbine fuel) in the identified spill area; evaluate the lateral extent of hydrocarbon impacts to soil and groundwater on the site and on the adjacent ROW; determine soil type and groundwater depth, flow direction, hydraulic gradient, and velocity. NRT advanced 17 soil borings within and outside the spill area to evaluate the lateral extent of soil and groundwater impacts on the site and the adjacent ROW to the south. Soil and groundwater samples were collected and analyzed for polynuclear aromatic hydrocarbons (PAHs) to delineate the extent of impacts. Analytical results indicate that the extent of petroleum-impacted soils and groundwater related to the turbine fuel release is defined on the subject property and extends off-site onto the adjacent south ROW, but not reaching East Chicago Avenue. The majority of the site (impacted area) is restricted from public access by fencing along the ROW. Due to the shallow depth of soil impacts (less than two feet), a small portion of the contamination present adjacent to the buried fuel lines is accessible to the public and utility workers on the ROW. The detected levels of naphthalene and benzo(a)pyrene are below their respective risk-based screening levels (RBSLs) presented in the American Society for Testing and Materials (ASTM) *Standard Guide E 1739-95 for Risk-Based Correction Action Applied at Petroleum Release Sites*. These RBSLs are risk-based correction action target levels established by ASTM for chemicals of concern, in this case for naphthalene and benzo(a)pyrene. These ASTM RBSLs were relied upon, since direct contact and soil leachate values are currently not established by the IDEM, nor were calculated as part of this investigation.

Impacts to groundwater were detected as dissolved-phase, non-carcinogenic PAHs present predominantly on site. No free-phase product was encountered during this investigation. The detected levels of naphthalene and benzo(a)pyrene are below their respective ASTM RBSLs for ingestion pathway at industrial sites.

Groundwater flow data and analytical data indicate that the plume is migrating toward the west-northwest (toward Tank #4) under a low hydraulic gradient and moderate groundwater velocity. Based on this and the low mobility of PAHs, the portion of the plume detected on the site is expected to remain on the site. Impacts detected off-site on the ROW are expected to migrate under the same conditions on the ROW and onto the site.

1 INTRODUCTION

1.1 Overview

Natural Resource Technology, Inc. (NRT) was retained by CITGO Petroleum Corporation (CITGO) to perform a site investigation at Dikeyard 4 of the CITGO Terminal facility located at 2500 East Chicago Avenue (State Highway 312) in East Chicago, Indiana (Figures 1 and 2). The investigation was conducted in response to a release of turbine fuel at the site. This report describes the scope of work, presents the results of the investigation, and provides conclusions based on the results.

1.2 Background

The turbine fuel release was discovered on May 14, 1996 from the fill and transfer fuel piping located in the southeast corner of Dikeyard 4 (Tank #4) and along the adjacent right-of-way (ROW) to the south. Figures 2 and 3 show the investigation area relative to the tank location and ROW. The release was the apparent result of a leak from an underground, 16-inch diameter turbine fuel fill line. The suspected fill line was taken out-of-service and pressure tested to determine the location of the leak. A portion of the fill line failed the pressure test and was abandoned and replaced with a new fill line. CITGO excavated and dewatered a portion of the spill area to aid in the identification and repair of the fill line.

Following the repair of the piping and the recovery of the product, CITGO reported the release to the Indiana Department of Environmental Management (IDEM) Emergency Response on May 14, 1996. The release was reported as less than 100 gallons of turbine fuel and contained on the CITGO site. IDEM stated to NRT on September 24, 1996 that a written response to the release notification will not be provided to CITGO as the IDEM considers this release to be a minor incident based on the volume of the release (less than 100 gallons) and since a release to off-site property was not reported. IDEM release number 9605119 was assigned to the site.

1.3 Project Contacts

Project contacts include the following:

CITGO Contact:

CITGO Petroleum Corporation
2316 Terminal Drive
Arlington Heights, Illinois 60065
Attention: Mr. Scott Buckner (847) 437-3463

Environmental Consultant:

Natural Resource Technology, Inc.
23713 West Paul Road, Unit D
Pewaukee, Wisconsin 53072
Attention: Mr. Tim Mueller (414) 523-9000

1.4 Objectives

The objectives of the site investigation included the following:

- Determine the presence or absence of free-phase product (turbine fuel) in the identified spill area of Dikeyard 4;
- Evaluate the lateral extent of hydrocarbon impacts to soil and groundwater on the site and on the adjacent ROW to the south along East Chicago Avenue (State Highway 312);
- Determine soil type and groundwater depth, flow direction, hydraulic gradient, and velocity; and,
- Prepare a site investigation report for submittal to CITGO.

2 SOIL BORINGS AND SAMPLING

2.1 Soil Borings and Soil Sampling

On December 3 and 4, 1996, NRT advanced 17 soil borings within and outside the spill area to evaluate the lateral extent of soil and groundwater impacts on the site and the adjacent ROW to the south. The soil borings were drilled using a hydraulic probe devise to depths ranging between 8 to 12 feet below the ground surface (bgs). Soil boring locations are shown on Figure 3.

Soil samples were collected continuously at two foot intervals from each soil boring for soil classification and field screening for volatile organic vapors. Characterization of the soil samples was performed in accordance with the Unified Soil Classification System (USCS). Field screening of soil samples was performed using a photoionization detector (PID) equipped with a 11.7 eV lamp. Field screening samples were prepared by placing the sample in a one-quart glass container, then covering the container with aluminum foil, and allowing the sample to equilibrate to room temperature. The probe of the PID was then inserted through the foil and the peak response was recorded. Characterization of soil boring samples and field screening results are described on the soil boring logs included in Appendix A.

One soil sample from each boring was prepared for potential laboratory analysis of polynuclear aromatic hydrocarbons (PAHs). Only unsaturated soils were considered for potential laboratory analysis. Due to the presence of a shallow groundwater (approximately 1½ to 2 feet bgs), soil samples collected from a depth of 0 to 2 feet bgs were prepared for potential analysis. Based on field screening PID results, four soil samples, collected from the soil borings, were submitted for PAH analysis to SPL Environmental Laboratories, Inc. (SPL) in Traverse City, Michigan. Soil analytical reports are included in Appendix B.

2.2 Groundwater Sampling

During completion of the soil borings, groundwater samples were collected from 15 of the 17 soil borings and analyzed for PAHs to delineate the extent of groundwater impacts and to strategically determine locations for permanent groundwater monitoring wells. Groundwater samples were collected from temporary wells consisting of dedicated, plastic tubing and slotted, stainless steel sampling points inserted in the hydraulic probe borings. All sampling equipment was decontaminated between sampling events, and new plastic tubing was used at each groundwater sample location. Groundwater samples were extracted from the probe screen using a peristaltic pump and submitted to SPL for PAH analysis using USEPA Test Method 8310. Groundwater analytical reports are included in Appendix C.

All boreholes were abandoned in accordance with Indiana Administrative Code (IAC) 310 following the collection of soil and groundwater samples. Soil and groundwater investigative wastes by the investigation were contained in 55 gallon drums for future disposal.

3 GROUNDWATER MONITORING WELLS

3.1 Monitoring Wells

Three monitoring wells (MW-1, MW-2, and MW-3) were installed by NRT on December 4, 1996 to evaluate the lateral extent of on-site groundwater impacts and monitoring purposes. The wells were installed using hollow stem augers and constructed as four-inch diameter polyvinyl chloride (PVC) wells designed for groundwater recovery purposes, if needed. Each monitoring well was installed to a total depth of 11 feet bgs completed with a 10 foot screen designed to intersect the shallow water table. The wells were installed in accordance with IAC 310 by a licensed Indiana well driller. Well construction details are included as Appendix D. Well elevations were surveyed by NRT following the installation of the monitoring wells.

Monitoring well MW-1 was installed at the north extent of groundwater impact indicated by the groundwater sampling data collected from the temporary wells. Monitoring wells MW-2 and MW-3 were installed in areas of groundwater impacts near the source area to allow for the recovery of potential free-phase product, if present. Approximately three weeks following installation, the monitoring wells were developed by surging with a bailer and pumping with a submersible pump. All groundwater purged during the development activities was placed in 55 gallon steel drums for potential future disposal.

3.2 Soil and Groundwater Sampling

One soil sample was collected from well boring MW-3 and analyzed for PAHs by SPL. Approximately three weeks following the installation of the monitoring wells, one round of groundwater samples were collected and submitted for PAH analysis. Approximately three to five well volumes of water were purged from each well prior to groundwater sampling. Groundwater depths and the potential for free-phase product were measured in each well prior to

sampling. Soil and groundwater analytical reports are included in Appendices B and C, respectively.

3.3 Field Hydraulic Tests

All three monitoring wells were hydraulically tested by baildown recovery and analyzed using the Bouwer and Rice method to characterize the hydraulic properties of the unconsolidated deposits. From the test data, NRT calculated hydraulic conductivities and groundwater flow velocities in the shallow aquifer at each well location. This data will aid in the evaluation of remedial action alternatives, if warranted. Baildown recovery (slug) test results are included in Appendix E. Groundwater levels were measured in each monitoring well prior to groundwater sampling. A horizontal hydraulic gradient was calculated based on the measured groundwater levels. Hydraulic gradient and groundwater velocity calculations are included in Appendix F.

4 INVESTIGATION RESULTS

4.1 Soil Sample Analyses

Soils were predominantly fine to medium sands extending to at least 12 feet bgs. PID soil screening results indicated the presence of organic vapors in shallow-depth (0 to 2 feet) soils extending less than 80 feet to the north and northwest and less than 40 feet to the south, east, and west directions from the release area (turbine transfer pipe near boring SB-15). PID readings were detected in off-site soil samples SB-12 and SB-13 located at the property boundary, but not in samples collected further off-site to the south in borings SB-9 and SB-10 (Figure 3). PID responses ranged from 24 to 481 instrument units (IU), with the highest responses detected at and near the source area (turbine pipe area) and decreasing laterally away from the release.

Soil analytical results are also depicted on Figure 4. Soil analytical results indicated total PAH impacts in soils (0 to 2 feet) in the release area ranging from 73,821 to 195,721 micrograms per kilogram (µg/kg), and naphthalene concentrations ranging from 11,000 to 25,000 µg/kg. The two off-site soil samples (SB12-1 and SB13-1), collected within the ROW to the south, contained the highest total PAH and naphthalene concentrations. Total PAHs and naphthalene concentrations in soil sample SB1-1, collected north of the release area, were reported at 286 and less than 60 µg/kg (below detection), respectively. The concentrations detected in soil sample SB1-1 were significantly lower compared to the PAH concentrations detected in the other four samples. Table 1 and Figure 4 summarize the soil analytical results.

4.2 Groundwater Sample Analyses

Table 2 and Figure 5 summarizes the groundwater analytical results. Groundwater analytical results are also depicted on Figure 5. Groundwater sampling results from the temporary and permanent monitoring wells indicate total PAH concentrations ranging from 6 to 904 µg/L in groundwater samples collected from on-site wells and 6 to 7 µg/L in the samples collected from

off-site temporary wells. Detectable concentrations of naphthalene ranged from 6 to 300 µg/L. The highest PAH and naphthalene concentrations were detected in the samples collected from on-site temporary wells SB-6 and SB-15, both of which are located in the proximity of the release (Figure 5). Off-site groundwater impacts were very low relative to PAH impacts detected in groundwater samples collected from on-site wells. PAH compounds detected during this sampling event included naphthalene, acenaphthylene, fluorene, 1-methylnaphthalene, and 2-methylnaphthalene.

No free-phase product was encountered during the drilling and sampling phase of this investigation.

4.3 Cleanup Criteria Pertinent to Site

At present, soil and groundwater cleanup standards for petroleum hydrocarbons are to background levels. The IDEM is currently preparing a draft guidance document which will establish risk-based soil and groundwater remediation criteria. The draft guidance document is based on *ASTM Standard E 1739-95 Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*, and also considers remediation by natural attenuation and other similar state programs. The draft document is schedule to be completed for public comment by October 24, 1997. The IDEM anticipates the document to become final for implementation by March 1998. Information provided by the IDEM (August 1997) indicates that PAHs which will drive soil and groundwater cleanup include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. These seven PAHs are classified by the USEPA as probable human carcinogens. Naphthalene is being considered for addition to this list, primarily on the basis of its significantly higher solubility relative to other PAHs. Soil cleanup levels will be provided on "Look-up Tables" currently being prepared by the IDEM. Draft copies of the Look-up Tables are not currently available.

Drinking water maximum contaminant levels (MCLs) for the carcinogenic PAHs are currently being used by the IDEM as a guideline to enforce groundwater cleanup to background levels. None of the seven carcinogenic PAHs were detected in the groundwater samples collected during this investigation

4.4 Groundwater Flow

Groundwater level measurements collected by NRT on December 26, 1996 from the three on-site monitoring wells indicated a west-northwest groundwater flow direction (Figure 6). Depth to groundwater at the site on December 26, 1996 ranged from between 1 1/2 to 2 feet bgs. CITGO terminal representatives indicated that the water table occasionally reaches ground surface. Table 3 summarizes the measured groundwater depths and elevations.

A slight horizontal groundwater gradient was calculated across the investigation area at 0.0044 feet/foot to the west-northwest. The hydraulic gradient calculation is presented in Appendix D.

Results of the baildown recovery tests indicated hydraulic conductivities (K) in the shallow groundwater ranging from 1.44×10^{-3} feet/minute (7.31×10^{-4} centimeters per second, cm/s) to 2.34×10^{-3} feet/minute (1.18×10^{-4} cm/s). Graphical output of the baildown recovery data are included in Appendix C. The estimated K values are comparative to average values for sand (Freeze and Cherry, 1979). Estimated K values are consistent for soils screened by the monitoring wells.

Based on the calculated hydraulic conductivities, the calculated average linear groundwater flow velocity at the water table was 3.8×10^{-5} feet/minute (2.0×10^{-5} cm/sec) or approximately 20 feet per year. Groundwater flow velocity calculations are included in Appendix D.

5 CONCLUSIONS

5.1 Soil Impacts

Analytical results indicate that the extent of petroleum-impacted soils related to the turbine fuel release is defined on the subject property and extends off-site onto the adjacent south ROW, but not reaching East Chicago Avenue. Based on the nature of the release (occurring below ground) and high water table, soil impacts above the water table are likely attributed to a fluctuating water table. The IDEM interprets soil contamination to occur within both unsaturated and saturated soil.

The majority of the site (impacted area) is restricted from public access by fencing along the ROW. The detected levels of naphthalene and benzo(a)pyrene are below their respective risk-based screening levels (RBSLs) presented in the American Society for Testing and Materials (ASTM) *Standard Guide E 1739-95 for Risk-Based Correction Action Applied at Petroleum Release Sites*. These RBSLs are risk-based correction action target levels established by ASTM for chemicals of concern, in this case for naphthalene and benzo(a)pyrene. These ASTM RBSLs were relied upon, since direct contact and soil leachate values are currently not established by the IDEM, nor were calculated as part of this investigation. Due to the shallow depth of soil impacts (less than two feet), a small portion of the contamination present adjacent to the buried fuel lines is accessible to the public and utility workers on the ROW.

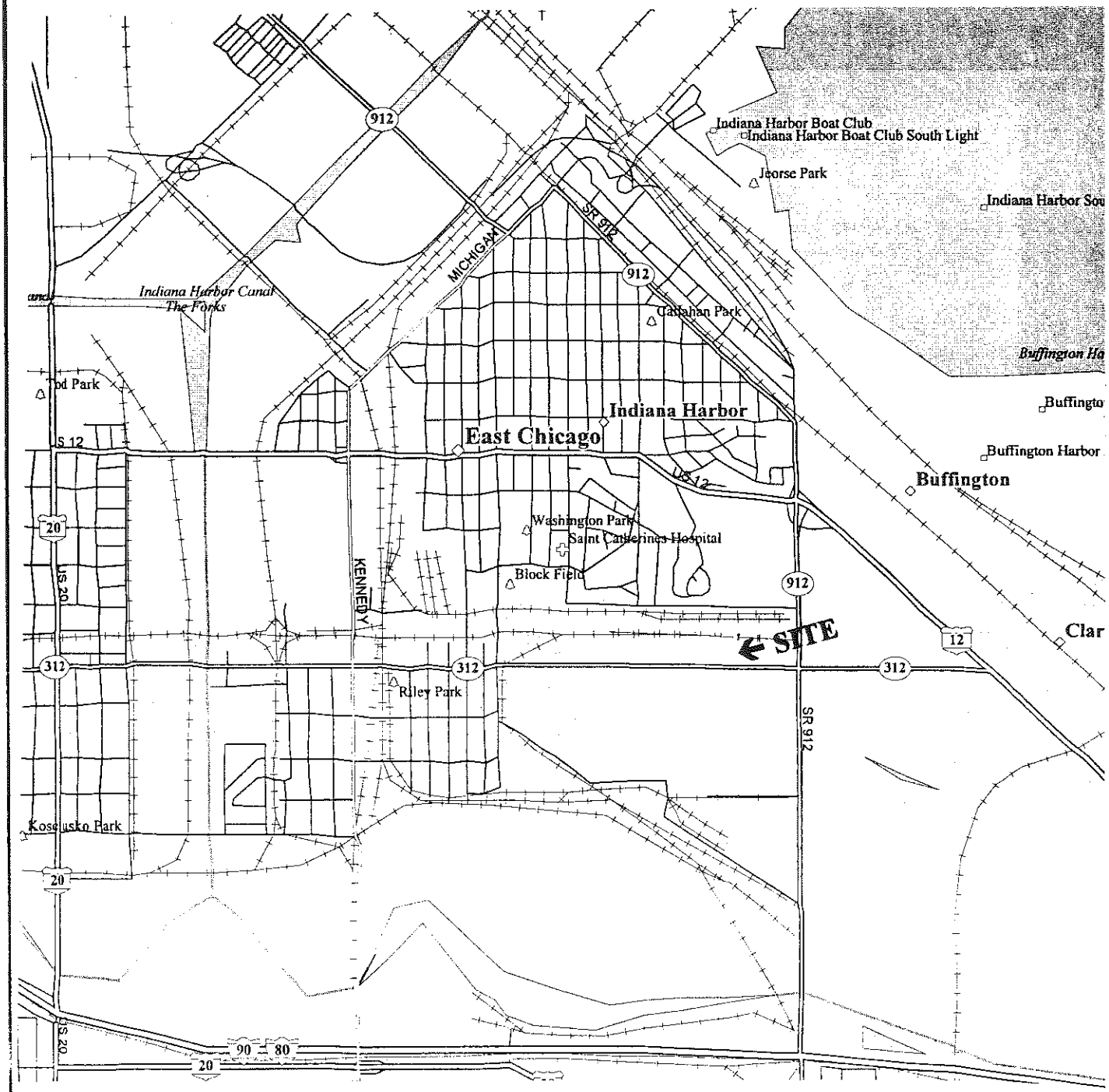
The on-site earth berms located to the south and east of the site investigation area will prevent surficial drainage onto the adjacent ROW during times when the water table reaches ground surface. As indicated in this report, the fill line was pressure tested and a portion was replaced to prevent future releases.

5.2 Groundwater Impacts

Impacts to groundwater were detected as dissolved-phase, non-carcinogenic PAHs present predominantly on site. No free-phase product was encountered during this investigation. Groundwater analytical results indicate that the north, west, and east extent of the release is defined. The greatest levels of groundwater impact were detected on-site in the release area in the proximity of the above grade transfer and fill fuel lines. Low levels of naphthalene were detected in groundwater samples collected off-site within the ROW approximately 15 feet east and west of the buried fuel lines. The detected levels of naphthalene and benzo(a)pyrene are below their respective ASTM RBSLs for ingestion pathway at industrial sites.

Groundwater flow data and analytical data indicate that the plume is migrating toward the west-northwest (toward Tank #4) under a low hydraulic gradient and moderate groundwater velocity. Based on this and the low mobility of PAHs, the portion of the plume detected on the site is expected to remain on the site. Impacts detected off-site on the ROW are expected to migrate under the same conditions on the ROW and onto the site.

FIGURES



N

Scale

2000 Feet

1000 Meters

SOURCE: DeLORME MAPPING
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Natural Resource Technology

N R T

SITE LOCATION MAP

CITGO PETROLEUM CORPORATION
EAST CHICAGO TERMINAL
EAST CHICAGO, INDIANA

DRAWN BY: TAS APPROVED BY: TEM DATE: 1-7-97

PROJECT NO. 1195

DRAWING NO. 1195-A01

FIGURE NO. 1

CONT ON DWG 470P1400

435.0 N
3487.0 W

N.I.P.S.C.O. 20" GAS MAIN "DEAD"

435. N
3037. W

12" TEXACO-CITIES SERVICE PL.
DEAD/ABANDON BY MARATHON PL.

435. N
2587. W

12" PIPELINE AMOCO

435. N
2137. W

435. N
1687. W

N

TANK #9 3262' W
275' N

TANK #8 2812' W
275' N

TANK #5 2348' W
275' N

TANK #4 1912' W
275' N

DETAIL "B" THIS DWG

DETAIL "A" THIS DWG

DETAIL "C" THIS DWG

DETAIL "D" THIS DWG

DETAIL "F" THIS DWG

DETAIL "E" THIS DWG

3223 W
3179.31 W
3167.31 W
2807.33 W
2865.33 W
2871. W
2304. W
2265.31 W
2255.31 W
2247.31 W
2007.33 W

L-171-16" SO. TURBINE FILL 153.0 N
L-169-16" F.O. TRANSFER 142.5 N
L-170-16" NO. N.L. TRANSFER 139.5 N

155.0 N

L-171-16"
L-169-16"
L-170-16"

24" SUCT. TO BADGER & WESTSHORE 168 N
2587. W

L-238-12" REFOMER DEAD 145.5 N
L-171-16" SO. TURBINE FILL 153.0 N
L-132-16" NO. GASO. FILL 150. N
L-169-16" F.O. TRANSFER 142.5 N
L-170-16" NO. N.L. TRANSFER 139.5 N

3-2" CONDUITS (FOR OFFICE CONTROLS) STUBBED UP W/CAPS

12" TRANSMISSION NATURAL GAS P/L NIPSCO
(CENTERED IN DITCH 3' MIN. COVER)

CHICAGO AVENUE

CHICAGO AVENUE

4-16" LINES & 1-12" LINE IN 20" SLEEVES FROM FENCE TO FENCE

12" SLEEVE(USED FOR CONDUITS) 1768. W

2823 W
2902 W

14' ROADWAY ℄ 21. S

3204' W
42' S

2848' W
42' S

2813' W
95' S

2822' W
180' S

2470' W
42' S

2092' W
42' S

1714' W
42' S

14' ROADWAY ℄ 663 W

L-165-12"-R.O.-129. S
L-168-16"-GASO.-132. S

NO. GASO. FILL
NO. N/L TRANSFER
16" RISER STUBBED UP VERTICAL
SO. TURBINE FILL
NO. GASO. FILL
12" - L238 DRAINED & ABANDON
#2 F.O. TRANSFER DRAINED & ABANDON
NO. N/L TRANSFER
SKILLET BLIND
F.O. TRANSFER
EL. B.O.P. 1.0'

ANCHOR FOR DETL SEE DWG 470P1400

3" WATER DRAW-OFF ℄ EL. 9.5
6" PUMP OUT ℄ EL. 9.5
14" SUCT. & DISC. ℄ EL. 10.5
16x14" CONC. RED
14" GENERAL TWIN SEAL
℄ TANK J9
12'-0"
8'-0"
16" X 14" CON. RED.
4.5"
22.5°
℄ TANK J8
℄ TANK J5
℄ TANK J4
5" PUMP CUT-℄ EL. 9.5
3" WATER DRAW-OFF ℄ EL. 9.5

DETAIL " B "
1/8 = 1'-0" EL B.O.P 5.9'

DETAIL " A "
1/8 = 1'-0"

DETAIL " C "
1/8 = 1'-0"

DETAIL " D "
1/8 = 1'-0"

DETAIL " E "
1/8 = 1'-0"

DETAIL " F "
1/8 = 1'-0"

3178.31 W
3171.31 W
3178.31 W
2907.31 W
2889.33 W
2895.33 W
2265.31 W
2253.31 W
2249.31 W
2007.33 W
1999.33 W
1995.33 W
1990.4 W

16" GENERAL TWIN SEAL
24" SUCT. 24X24X16 RED. TEE
GRADE
16" NO. GASO. FILL

L-171-16"-SO. TURBINE FILL 153' N (16" FILL LINE)
EL. B.O.P. 3.0'
L-169-16"-FUEL OIL 142.5 N-16" TRANSFER
L-170-16"-NO. N\L TRANSFER-139.5 N

SO. TURBINE FILL
NO. GASO. FILL
NO. N/L TRANSFER
F.O. TRANSFER
SKILLET BLIND
12" WELD CAP
L-132-16"-N.O. FILL-150.0 N.
L-169-16"
L-170-16"
L-169-16"-F.O. TRANSFER-142.0 N.
L-170-16"-NO. N/L TRANSFER-136.5 N.

6'-0" ON THE SHELL
1'-2" L
6" PUMP OUT
30°
C 14" NOZZEL
C EL. 10.5'

1'-0"
10'-6"
45° ELL
EL. 5.0'
EL. 3.0'
138.0 N.
142.5 N.
147.0 N. 6" FIRE LINE
153.0 N.

SECTION " 1-1 "
1/8 = 1'-0"

NOTE: ALL ELEVATIONS TO BOTTOM OF PIPE UNLESS OTHERWISE NOTED

L:\PROJFILE\470\DWG\470P1300 8/27/96 11:03:44 am CST

NO.	REVISION	BY	DATE	BY	DATE	BY	DATE	ENGR	BY	DATE
2	AS BUILT	CR	8/96							
1	REDRAWN & REVISED IN ACAD	MF	1/96							
REFERENCE DRAWINGS		DRAWN		DETAIL CK.		FINAL CK.			APPROVED	

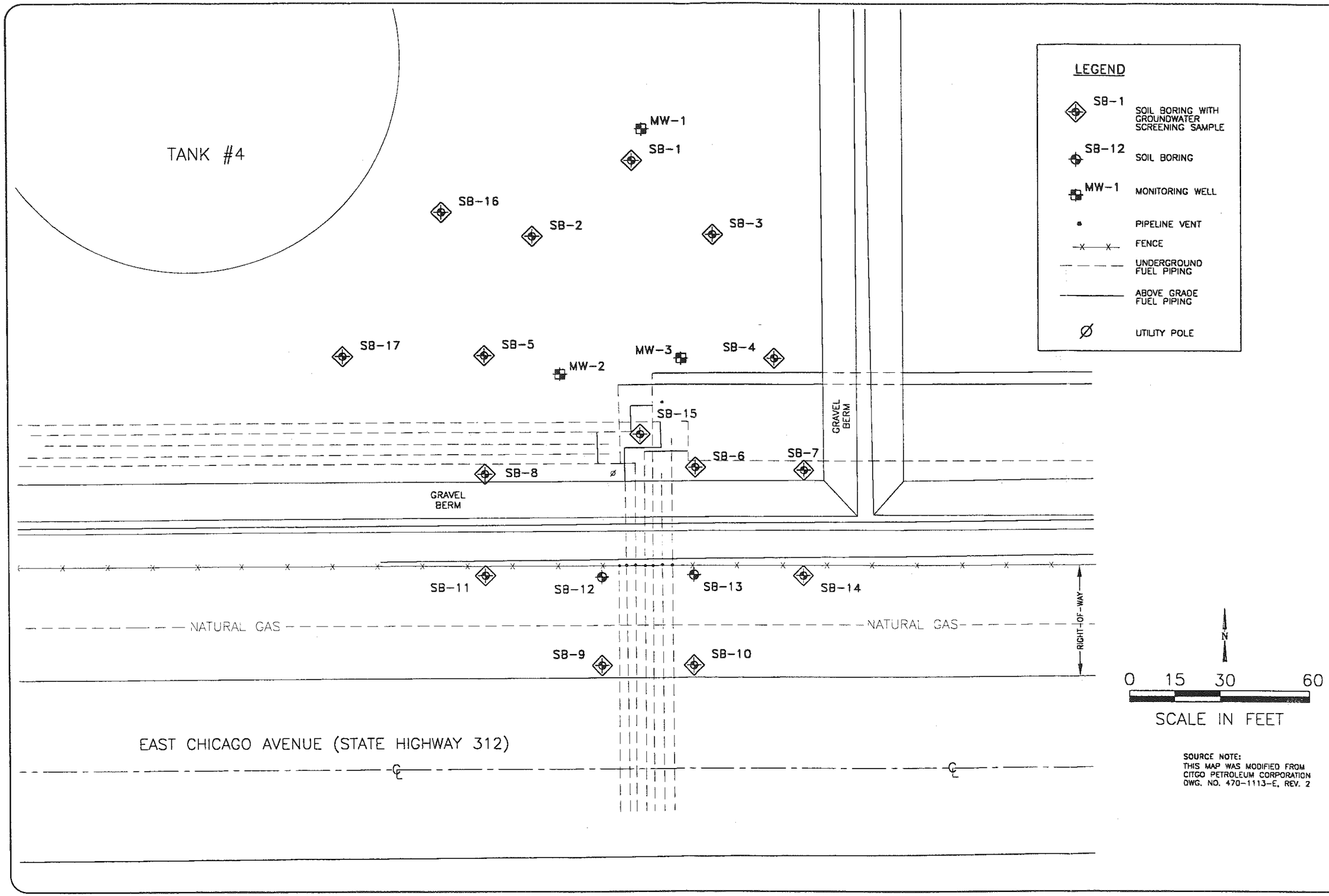
SCALE 1" = 80' — DATE 12/12/95
DRAWN BY M. FOSTER
DETAIL CK.
FINAL CK.
ENGR.
APPROVED BY
P.E. NO.

CITGO Petroleum Corporation

EAST CHICAGO TERMINAL

TITLE: STORAGE TANKS PIPING AT TANKS # 4, 5, 8, & 9 - ARRANGMENT DETAILS

DWG NO. 470-1113-E



SOURCE NOTE:
THIS MAP WAS MODIFIED FROM CITGO PETROLEUM CORPORATION DWG. NO. 470-1113-E, REV. 2

DRAWN BY: TAS DATE: 9/4/97
CHECKED BY: KMJ DATE: 11/7/97
APPROVED BY: TEM DATE: 11-7-97
AUTOCAD FILE: 1195-B01.DWG

SITE MAP

SITE INVESTIGATION
CITGO PETROLEUM CORPORATION
EAST CHICAGO TERMINAL
EAST CHICAGO, INDIANA

Natural Resource Technology

PROJECT NO. 1195/3

DRAWING NO. 1195-B01

FIGURE NO. 3

TANK #4

MW-1

SB-1
ND/286

SB-16

SB-2

SB-3

SB-17

SB-5

MW-3
11,000/73,821

SB-4

MW-2

SB-15

GRAVEL BERM

SB-7

SB-8

SB-6
16,000/122,120

GRAVEL BERM

SB-11

SB-12
25,000/195,721

SB-13
17,000/167,401

SB-14

NATURAL GAS

NATURAL GAS

RIGHT-OF-WAY

SB-9

SB-10

EAST CHICAGO AVENUE (STATE HIGHWAY 312)

LEGEND

SB-1 ND/286	SOIL BORING WITH GROUNDWATER SCREENING SAMPLE AND NAPHTHALENE/TOTAL PAHs (µg/KG) CONCENTRATIONS
SB-12 25,000/ 195,721	SOIL BORING AND NAPHTHALENE/TOTAL PAHs (µg/KG) CONCENTRATIONS
MW-3 11,000/ 73,821	MONITORING WELL AND NAPHTHALENE/TOTAL PAHs (µg/KG) CONCENTRATIONS
ND	NOT DETECTED
µg/KG	MICROGRAMS PER KILOGRAM
°	PIPELINE VENT
-x-x-	FENCE
- - - -	UNDERGROUND FUEL PIPING
———	ABOVE GRADE FUEL PIPING
∅	UTILITY POLE

N

0 15 30 60

SCALE IN FEET

SOURCE NOTE:
THIS MAP WAS MODIFIED FROM CITGO PETROLEUM CORPORATION DWG. NO. 470-1113-E, REV. 2

DRAWN BY: TAS DATE: 9/4/97

CHECKED BY: KMT DATE: 11/7/97

APPROVED BY: TEM DATE: 11-7-97

AUTOCAD FILE: 1195-B03.DWG

NAPHTHALENE AND TOTAL PAHs IN SOIL, DECEMBER 3-4, 1996

SITE INVESTIGATION

CITGO PETROLEUM CORPORATION
EAST CHICAGO TERMINAL
EAST CHICAGO, INDIANA

Natural Resource Technology

PROJECT NO. 1195/3

DRAWING NO. 1195-B03

FIGURE NO. 4

TANK #4

MW-1
ND/ND
SB-1
ND/ND

SB-16
9/19

SB-2
ND/ND

SB-3
ND/ND

SB-17
8/11

SB-5
8/11

MW-2
ND/54

MW-3
ND/37

SB-4
ND/ND

SB-15
280/904

SB-7
10/12

SB-8
6/6

SB-6
300/881

GRAVEL BERM

GRAVEL BERM

SB-11
6/6

SB-12

SB-13

SB-14
7/7

NATURAL GAS

NATURAL GAS

RIGHT-OF-WAY

SB-9
ND/ND

SB-10
ND/ND

EAST CHICAGO AVENUE (STATE HIGHWAY 312)

LEGEND

SB-1 ND/ND	SOIL BORING WITH GROUNDWATER SCREENING SAMPLE AND NAPHTHALENE/TOTAL PAHs (µg/L) CONCENTRATIONS IN SAMPLES COLLECTED ON DECEMBER 3 AND 4, 1996
SB-12	SOIL BORING
MW-3 ND/ND	MONITORING WELL AND NAPHTHALENE/TOTAL PAHs (µg/L) CONCENTRATIONS IN SAMPLES COLLECTED ON DECEMBER 26, 1996
ND	NOT DETECTED
µg/L	MICROGRAMS PER LITER
	PIPELINE VENT
	FENCE
	UNDERGROUND FUEL PIPING
	ABOVE GRADE FUEL PIPING
∅	UTILITY POLE

0 15 30 60

SCALE IN FEET

SOURCE NOTE:
THIS MAP WAS MODIFIED FROM CITGO PETROLEUM CORPORATION DWG. NO. 470-1113-E, REV. 2

DRAWN BY: TAS DATE: 9/4/97
CHECKED BY: KMJ DATE: 11/7/97
APPROVED BY: TEM DATE: 11-7-97
AUTOCAD FILE: 1195-804.DWG

NAPHTHALENE AND TOTAL PAHs IN GROUNDWATER, DECEMBER 26, 1996

SITE INVESTIGATION
CITGO PETROLEUM CORPORATION
EAST CHICAGO TERMINAL
EAST CHICAGO, INDIANA

Natural Resource Technology

PROJECT NO. 1195/3

DRAWING NO. 1195-804

FIGURE NO. 5

TANK #4

MW-1
93.66

93.60

93.70

93.80

MW-2
93.62

MW-3
93.79

GRAVEL BERM

GRAVEL BERM

NATURAL GAS

NATURAL GAS

RIGHT-OF-WAY

EAST CHICAGO AVENUE (STATE HIGHWAY 312)

℄

℄

LEGEND

93.60 GROUNDWATER CONTOUR

GENERAL GROUNDWATER FLOW DIRECTION

MW-1 93.66 MONITORING WELL AND GROUNDWATER ELEVATION

PIPELINE VENT

FENCE

UNDERGROUND FUEL PIPING

ABOVE GRADE FUEL PIPING

UTILITY POLE

N

0 15 30 60

SCALE IN FEET

SOURCE NOTE:
THIS MAP WAS MODIFIED FROM CITGO PETROLEUM CORPORATION DWG. NO. 470-1113-E, REV. 2

DRAWN BY: TAS DATE: 9/4/97

CHECKED BY: KHJ DATE: 11/7/97

APPROVED BY: TEM DATE: 11-7-97

AUTOCAD FILE: 1195-B02.DWG

GROUNDWATER FLOW MAP
DECEMBER 26, 1996
SITE INVESTIGATION
CITGO PETROLEUM CORPORATION
EAST CHICAGO TERMINAL
EAST CHICAGO, INDIANA

Natural Resource Technology

PROJECT NO. 1195/3

DRAWING NO. 1195-B02

FIGURE NO. 6

TABLES

Table 1

Soil Analytical Summary - PAHs
Site Investigation - CITGO East Chicago Terminal
East Chicago, Indiana

Sample Name/Location	Sample Depth (feet)	Sampling Date	PID Reading (ppm)	Product Odor	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Indeno(1,2,3-cd)pyrene	1-methylnaphthalene	2-methylnaphthalene	Total PAHs
SB1-1	0-2	12/3/96	nd	no odor	nd	nd	nd	nd	nd	nd	nd	nd	6	6	nd	nd	nd	nd	nd	nd	180	94	286
SB6-1	0-2	12/3/96	380	strong	16000	4100	3500	1300	1500	400	nd	nd	260	60	nd	nd	nd	nd	nd	nd	33000	62000	122120
SB-12-1	0-2	12/4/96	225	strong	25000	8000	5200	1800	1900	280	190	nd	130	70	28	nd	24	11	70	18	58000	95000	195721
SB-13-1	0-2	12/4/96	320	strong	17000	6300	4300	1500	1600	230	150	nd	130	62	31	7	21	12	58	nd	44000	92000	167401
MW3-1	0-2	12/4/96	nm	slight	11000	3900	3700	1300	1700	240	140	220	490	160	290	43	260	63	230	85	25000	25000	73821

Notes:

(1) PAHs = polynuclear aromatic hydrocarbons.
(2) Only compounds detected by analysis are reported in above table.
(3) All values expressed in micrograms per kilogram (ug/kg).
(4) nd = parameter not detected above the laboratory method detection limit.
(5) PID = photoionization detector.
(6) ppm = parts per million.
(7) nm = not measured.

prepared by: KSG 4/97
checked by: EPK 4/97

Table 2

Groundwater Analytical Summary - PAHs
Site Investigation - CITGO East Chicago Terminal
East Chicago, Indiana

Well / Sample Name	Sampling Date	Naphthalene	Acenaphthylene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Total PAHs
Temporary Well Samples							
SB-1	12/3/96	nd	nd	nd	nd	nd	nd
SB-2	12/3/96	nd	nd	nd	nd	nd	nd
SB-3	12/3/96	nd	nd	nd	nd	nd	nd
SB-4	12/3/96	nd	nd	nd	nd	nd	nd
SB-5	12/3/96	8	3	nd	nd	nd	11
SB-6	12/3/96	300	55	6	170	350	881
SB-7	12/3/96	10	nd	nd	nd	2	12
SB-8	12/3/96	6	nd	nd	nd	nd	6
SB-9	12/3/96	nd	nd	nd	nd	nd	nd
SB-10	12/3/96	nd	nd	nd	nd	nd	nd
SB-11	12/4/96	6	nd	nd	nd	nd	6
SB-14	12/4/96	7	nd	nd	nd	nd	7
SB-15	12/4/96	280	78	6	160	380	904
SB-A*	12/4/96	150	nd	nd	330	100	580
SB-16	12/4/96	9	10	nd	nd	nd	19
SB-17	12/4/96	8	3	nd	nd	nd	11
Monitoring Well Samples							
MW-1	12/26/96	nd	nd	nd	nd	nd	nd
MW-2	12/26/96	nd	nd	nd	44	10	54
MW-3	12/26/96	nd	nd	nd	27	10	37
MW-A**	12/26/96	2	5	nd	2	14	23

Notes:
(1) PAHs = polynuclear aromatic hydrocarbons.
(2) Only compounds detected by analysis are reported in above table.
(3) All values expressed in micrograms per liter (ug/l).
(4) nd = parameter not detected above laboratory detection limit.
(4) * = duplicate sample of SB-15.
(5) ** = duplicate sample of MW-3.

Prepared by: KSG 4/97
Checked by EPK 4/97

Table 3

Groundwater Elevation and Well Construction Summary

Site Investigation
CITGO Petroleum Corporation
CITGO East Chicago Terminal
East Chicago, Indiana

	MW-1	MW-2	MW-3
Well Construction Detail	**Monitoring Well Construction Summary**		
Ground Surface Elevation (feet)	95.53	95.70	95.89
Top of PVC Elevation (feet)	97.39	97.44	97.36
Top of Screen Elevation (feet)	94.53	94.70	94.88
Well Screen Length (feet)	10	10	10
Total Well Depth (feet)-bgs	11	11	11
Measurement Date	**Depth to Water (in feet below top of PVC)**		
December 26, 1996	3.73	3.82	3.57
Measurement Date	**Depth to Water (in feet below ground surface)**		
December 26, 1996	1.87	2.08	2.10
Measurement Date	**Water Level Elevation in feet**		
December 26, 1996	93.66	93.62	93.79
Measurement Date	**Water Level Above / Below (-) Top of Screen in feet**		
December 26, 1996	-0.87	-1.08	-1.09

prepared by: TEM 5/97
checked by: KMJ 9/97

APPENDIX A

SOIL BORING LOGS

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-1*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB1-1			2	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			NO						
SB1-3			4					NO						
SB1-5			6					NO						
SB1-7			8					NO						
SB1-9			10					NO						
SB1-11			12					NO						
			12	End of Boring at 12'										
			14											
			16											
			18											
			20											
			22											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-2*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB2-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			24.2						
SB2-3			2 3 4					28.6						
SB2-5			5 6					32.5						
SB2-7			7 8					28.8						
			9 10 11	End of Boring at 8'										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-3*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane** **Feet N** **Feet E**	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB3-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB3-3			3					ND						
SB3-5			5					ND						
SB3-7			7					ND						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

NRT Log Form – State of Indiana

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-4*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (if applicable)** ☐ N ☐ E ☐ S ☐ W
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB4-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB4-3			2 3 4					ND						
SB4-5			5 6					ND						
SB4-7			7 8					ND						
			8	End of Boring at 8'										
			9 10 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-5*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	Lat Long	**Local Grid Location (if applicable)** ☐ *N* ☐ *E* ☐ *S* ☐ *W*
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB5-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			124						
SB5-3			2 3 4					135						
SB5-5			5 6					112						
SB5-7			7 8					115						
			9 10 11	End of Boring at 8'										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-6*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB6-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			380						
SB6-3			2 3					410						
SB6-5			4 5					392						
SB6-7			6 7					354						
			8	End of Boring at 8'										
			9 10 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

NRT Log Form – State of Indiana

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-7*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB7-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB7-3			2 3 4					ND						
SB7-5			5 6					ND						
SB7-7			7 8					ND						
			8	End of Boring at 8'										
			9 10 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-8*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ *N* ☐ *E* ☐ *S* ☐ *W*
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB8-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB8-3			2					ND						
SB8-5			3					ND						
SB8-7			4					ND						
			5											
			6											
			7											
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-9*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	Lat Long	**Local Grid Location (if applicable)** ☐ *N* ☐ *E* ☐ *S* ☐ *W*
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB9-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB9-3			2 3 4					ND						
SB9-5			5 6					ND						
SB9-7			7 8					ND						
			8	End of Boring at 8'										
			9 10 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	Natural Resource Technology

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-10*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	Lat Long	**Local Grid Location (if applicable)** ☐ *N* ☐ *E* ☐ *S* ☐ *W*
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB10-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB10-3			2 3 4					ND						
SB10-5			5 6					ND						
SB10-7			7 8					ND						
			8	End of Boring at 8'										
			9 10 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-11*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane** **Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB11-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB11-3			2 3 4					ND						
SB11-5			5 6					ND						
SB11-7			7 8					ND						
			9 10 11	End of Boring at 8'										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-12*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ *N* ☐ *E* ☐ *S* ☐ *W*
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB12-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			225						
SB12-3			2 3					452						
SB12-5			4 5					381						
SB12-7			6 7					276						
			8	End of Boring at 8'										
			9 10 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-13*	
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*		**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
	Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*		

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB13-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			320						
SB13-3			2											
			3					481						
SB13-5			4											
			5					427						
			6											
SB13-7			7					210						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-14*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/04/96*	**Date Drilling Completed** *12/04/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ E ☐ S ☐ W
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB14-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB14-3			2											
			3					ND						
SB14-5			4											
			5					ND						
SB14-7			6											
			7					ND						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-15*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/04/96*	**Date Drilling Completed** *12/04/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (if applicable)** ☐ N ☐ E ☐ S ☐ W
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB15-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			284						
SB15-3			2											
			3					305						
			4	End of Boring at 4'										
			5											
			6											
			7											
			8											
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-16*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/04/96*	**Date Drilling Completed** *12/04/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (if applicable)** ☐ *N* ☐ *E* ☐ *S* ☐ *W*
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB16-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			22.4						
SB16-3			3					18.2						
SB16-5			5					15.1						
SB16-7			7					17.8						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	**Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

APPENDIX C

GROUNDWATER ANALYTICAL REPORTS

Certificate of Analysis No. M1-9612181-01

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-1

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	111	50	120

ANALYZED BY: TGR
DATE/TIME: 12/21/96 03:40:53
EXTRACTED BY: VS
DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

MICHIGAN LAB
HUGHES DRIVE
TRAVERSE CITY, MI
SPL-MICH

Certificate of Analysis No. M1-9612181-02

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-2

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	67	50	120

ANALYZED BY: TGR DATE/TIME: 12/20/96 16:13:58
EXTRACTED BY: VS DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-03

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-3

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	102	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 16:54:21
EXTRACTED BY: VS
DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-04

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-4

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	91	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 17:34:45
EXTRACTED BY: VS
DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-05

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-5

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	8	1.8	µg/L
Acenaphthylene	3	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	87	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 18:15:08
EXTRACTED BY: VS
DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit
ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-06

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-6

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	300	36	µg/L
Acenaphthylene	55	46	µg/L
Acenaphthene	ND	36	µg/L
Fluorene	6	4.2	µg/L
Phenanthrene	ND	12.8	µg/L
Anthracene	ND	13.2	µg/L
Fluoranthene	ND	4.2	µg/L
Pyrene	ND	5.4	µg/L
Chrysene	ND	3.0	µg/L
Benzo (a) anthracene	ND	0.26	µg/L
Benzo (b) fluoranthene	ND	0.36	µg/L
Benzo (k) fluoranthene	ND	0.34	µg/L
Benzo (a) pyrene	ND	0.46	µg/L
Dibenzo (a,h) anthracene	ND	0.6	µg/L
Benzo (g,h,i) perylene	ND	1.5	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.86	µg/L
1-Methylnaphthalene	170	36	µg/L
2-Methylnaphthalene	350	36	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	58	50	120

ANALYZED BY: TGR
DATE/TIME: 12/21/96 10:48:57
EXTRACTED BY: VS
DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS: HIGH TOTAL PETROLEUM HYDROCARBONS CAUSED ELEVATED DETECTION LIMITS.

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-07

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-7

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	10	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	2	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	64	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 20:16:19
EXTRACTED BY: VS
DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-08

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-8

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	6	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	92	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 20:56:43
EXTRACTED BY: VS
DATE/TIME: 12/10/96 16:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

[illegible]
45 [illegible] DRIVE
TRAVERSE CITY, MI 49684
[illegible]

Certificate of Analysis No. MI-9612181-09

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-9

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	117	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 21:37:08
EXTRACTED BY: VS
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

MICHIGAN LAB
[illegible]
TRAVERSE CITY, MI 49684
[illegible]

Certificate of Analysis No. M1-9612181-10

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE W(
12/23/9(

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-10

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/03/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	87	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 22:17:32
EXTRACTED BY: VS
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-13

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-11

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/04/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	6	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	102	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 22:57:56
EXTRACTED BY: VS
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

[illegible]
[illegible] DRIVE
TRAVERSE CITY, MI 49686
[illegible]

Certificate of Analysis No. M1-9612181-14

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-14

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/04/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	7	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	101	50	120

ANALYZED BY: TGR
DATE/TIME: 12/20/96 23:38:21
EXTRACTED BY: VS
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-17

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-15

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/04/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	280	36	µg/L
Acenaphthylene	78	46	µg/L
Acenaphthene	ND	36	µg/L
Fluorene	6	4.2	µg/L
Phenanthrene	ND	12.8	µg/L
Anthracene	ND	13.2	µg/L
Fluoranthene	ND	4.2	µg/L
Pyrene	ND	5.4	µg/L
Chrysene	ND	3.0	µg/L
Benzo (a) anthracene	ND	0.26	µg/L
Benzo (b) fluoranthene	ND	0.36	µg/L
Benzo (k) fluoranthene	ND	0.34	µg/L
Benzo (a) pyrene	ND	0.46	µg/L
Dibenzo (a,h) anthracene	ND	0.6	µg/L
Benzo (g,h,i) perylene	ND	1.52	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.86	µg/L
1-Methylnaphthalene	160	36	µg/L
2-Methylnaphthalene	380	36	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	70	50	120

ANALYZED BY: TGR
DATE/TIME: 12/21/96 11:30:18
EXTRACTED BY: VS
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS: HIGH TOTAL PETROLEUM HYDROCARBONS CAUSED ELEVATED DETECTION LIMITS.

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

MICHIGAN LAB
825 HOLMES DRIVE
TRAVERSE CITY, MI 49684
1-800-SPLWICH
1-800-775-9424

Certificate of Analysis No. MI-9612181-18

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-16

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/04/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	9	1.8	µg/L
Acenaphthylene	10	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	84	50	120

ANALYZED BY: TGR
DATE/TIME: 12/21/96 00:59:11
EXTRACTED BY: VS
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612181-19

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-17

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/04/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	8	1.8	µg/L
Acenaphthylene	3	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	63	50	120

ANALYZED BY: TGR
DATE/TIME: 12/21/96 01:39:37
EXTRACTED BY: VS
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

MICHIGAN LAB
[illegible] HUGHES DRIVE
TRAVERSE CITY, MI 49684
[illegible]

Certificate of Analysis No. M1-9612181-20

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE WC
12/23/96

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: SB-A

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/04/96
DATE RECEIVED: 12/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	150	36	µg/L
Acenaphthylene	ND	46	µg/L
Acenaphthene	ND	36	µg/L
Fluorene	ND	4.2	µg/L
Phenanthrene	ND	12.8	µg/L
Anthracene	ND	13.2	µg/L
Fluoranthene	ND	4.2	µg/L
Pyrene	ND	5.4	µg/L
Chrysene	ND	3.0	µg/L
Benzo (a) anthracene	ND	0.26	µg/L
Benzo (b) fluoranthene	ND	0.36	µg/L
Benzo (k) fluoranthene	ND	0.34	µg/L
Benzo (a) pyrene	ND	0.46	µg/L
Dibenzo (a,h) anthracene	ND	0.6	µg/L
Benzo (g,h,i) perylene	ND	1.52	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.86	µg/L
1-Methylnaphthalene	330	36	µg/L
2-Methylnaphthalene	100	36	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	56	50	120

ANALYZED BY: TGR
EXTRACTED BY: VS
DATE/TIME: 12/23/96 05:05:29
DATE/TIME: 12/10/96 17:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612567-01

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE GW
01/14/97

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: MW-1

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/26/96
DATE RECEIVED: 12/28/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	1.8	µg/L
Acenaphthylene	ND	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	ND	1.8	µg/L
2-Methylnaphthalene	ND	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	111	50	120

ANALYZED BY: TGR
DATE/TIME: 01/09/97 12:23:40
EXTRACTED BY: VS
DATE/TIME: 12/31/96 10:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

Certificate of Analysis No. M1-9612567-02

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE GW
01/14/97

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: MW-2

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/26/96
DATE RECEIVED: 12/28/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	9	µg/L
Acenaphthylene	ND	12	µg/L
Acenaphthene	ND	9	µg/L
Fluorene	ND	1.1	µg/L
Phenanthrene	ND	3.2	µg/L
Anthracene	ND	3.3	µg/L
Fluoranthene	ND	1.1	µg/L
Pyrene	ND	1.4	µg/L
Chrysene	ND	0.75	µg/L
Benzo (a) anthracene	ND	0.065	µg/L
Benzo (b) fluoranthene	ND	0.090	µg/L
Benzo (k) fluoranthene	ND	0.085	µg/L
Benzo (a) pyrene	ND	0.12	µg/L
Dibenzo (a,h) anthracene	ND	0.15	µg/L
Benzo (g,h,i) perylene	ND	0.38	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.22	µg/L
1-Methylnaphthalene	44	9	µg/L
2-Methylnaphthalene	10	9	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	60	50	120

ANALYZED BY: TGR
DATE/TIME: 01/10/97 17:48:04
EXTRACTED BY: VS
DATE/TIME: 12/31/96 10:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS: HIGH TOTAL PETROLEUM HYDROCARBONS CAUSED ELEVATED DETECTION LIMITS.

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

SPL

[illegible]

Certificate of Analysis No. M1-9612567-03

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.#
2642, TYPE GW
01/14/97

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: MW-3

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/26/96
DATE RECEIVED: 12/28/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	9	µg/L
Acenaphthylene	ND	12	µg/L
Acenaphthene	ND	9	µg/L
Fluorene	ND	1.1	µg/L
Phenanthrene	ND	3.2	µg/L
Anthracene	ND	3.3	µg/L
Fluoranthene	ND	1.1	µg/L
Pyrene	ND	1.4	µg/L
Chrysene	ND	0.75	µg/L
Benzo (a) anthracene	ND	0.065	µg/L
Benzo (b) fluoranthene	ND	0.090	µg/L
Benzo (k) fluoranthene	ND	0.085	µg/L
Benzo (a) pyrene	ND	0.12	µg/L
Dibenzo (a,h) anthracene	ND	0.15	µg/L
Benzo (g,h,i) perylene	ND	0.38	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.22	µg/L
1-Methylnaphthalene	27	9	µg/L
2-Methylnaphthalene	10	9	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	107	50	120

ANALYZED BY: TGR DATE/TIME: 01/10/97 18:28:27
EXTRACTED BY: VS DATE/TIME: 12/31/96 10:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS: HIGH TOTAL PETROLEUM HYDROCARBONS CAUSED ELEVATED DETECTION LIMITS.

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

MICHIGAN LABS
481 HUGHES DRIVE
TRAVERSE CITY, MI 49684
(616) 947-5777
FAX 947-5474

Certificate of Analysis No. MI-9612567-04

CITGO PETROLEUM CORP.
2316 Terminal Drive
Arlington Hts., IL 60005
ATTN: Scott Buckner

P.O.# 2642, TYPE GW
01/14/97

PROJECT: CITGO - E. CHICAGO
SITE: E CHICAGO, IN
SAMPLED BY: NATURAL RESOURCE TECHNOLOGY
SAMPLE ID: MW-A

PROJECT NO: 1195
MATRIX: WATER
DATE SAMPLED: 12/26/96
DATE RECEIVED: 12/28/96

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	2	1.8	µg/L
Acenaphthylene	5	2.3	µg/L
Acenaphthene	ND	1.8	µg/L
Fluorene	ND	0.21	µg/L
Phenanthrene	ND	0.64	µg/L
Anthracene	ND	0.66	µg/L
Fluoranthene	ND	0.21	µg/L
Pyrene	ND	0.27	µg/L
Chrysene	ND	0.15	µg/L
Benzo (a) anthracene	ND	0.013	µg/L
Benzo (b) fluoranthene	ND	0.018	µg/L
Benzo (k) fluoranthene	ND	0.017	µg/L
Benzo (a) pyrene	ND	0.023	µg/L
Dibenzo (a,h) anthracene	ND	0.030	µg/L
Benzo (g,h,i) perylene	ND	0.076	µg/L
Indeno (1,2,3-cd) pyrene	ND	0.043	µg/L
1-Methylnaphthalene	2	1.8	µg/L
2-Methylnaphthalene	14	1.8	µg/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
p-Terphenyl-d14	10 µg/L	65	50	120

ANALYZED BY: TGR
DATE/TIME: 01/09/97 20:23:32
EXTRACTED BY: VS
DATE/TIME: 12/31/96 10:00:00
METHOD: 8310 Polynuclear Aromatic Hydrocarbons
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses were performed in accordance with EPA Guidelines for analysis and quality control.

APPENDIX D

WELL CONSTRUCTION DETAILS

RECORD OF WATER WELL

State Form 35680 (R4 / 4-92)

MW-2

Mail complete record within 30 days to:
INDIANA DEPARTMENT OF NATURAL RESOURCES
Division of Water
402 W.Washington St., Rm. W264
Indianapolis, IN 46204
(317) 232-4160

Fill in completely

WELL LOCATION

County where drilled	Civil township	Township	Range	Section
LAKE				

Driving directions to the well location (*include county road names, number, subdivision lot number with consideration to intersecting road and trip origination*). There is space for a map on reverse side.

(see back side)

OWNER - CONTRACTOR

Name of well owner: CITGO Petroleum Corporation
Telephone number: (847) 437-3463

Address (*number and street, city, state, ZIP code*): 2316 Terminal Drive, Arlington Heights, IL 60005

Name of building contractor:
Telephone number:

Address (*number and street, city, state, ZIP code*):

Name of drilling contractor: Rock & Soil Drilling Corporation
Telephone number: (630) 377-7190

Address (*number and street, city, state, ZIP code*): 1720 East Tyler Road, St. Charles, IL 60174

Name of equipment operator:
License number:
Date of completion:

CONSTRUCTION DETAILS

Use of well:
☐ Home ☐ Industry ☒ Test ☐ Irrigation
☐ Public supply ☐ Stock ☐ Other (*specify*):

Method of drilling:
☒ Rotary ☐ Jet ☐ Bucket rig
☐ Cable tool ☐ Rev. rotary ☐ Other

Casing length: 1 feet; Material: PVC (schedule 40); Diameter: 4 inches

Screen length: 10 feet; Material: PVC (schedule 40); Diameter: 4 inches

Screen slot size: .010

Total depth of well: 11 feet

Depth of pump setting: N/A

Water quality (*clear, cloudy, odor, etc.*):

Type of pump:
☐ Submersible ☐ Shallow-well jet ☐ Deep-well jet ☐ Other (*specify*): N/A

WELL CAPACITY TEST

Check one:
☐ Bailing ☒ Pumping ☐ Air

Test rate: 3 gpm 1/4 hrs.

Drawdown: ~ 2 feet

Static level (*depth of water*): ~ 1.5 feet

GROUTING INFORMATION

Grout material	Depth of grout	Method of installation	Number of bags used
bentonite	From 0 to 1	gravity	two

WELL ABANDONMENT

Sealing material	Depth filled From	To	Method of installation	Number of bags used

WELL LOG

FORMATIONS: Type of material	From (*feet*)	To (*feet*)
SAND: fine to medium gr.	0	12

(*Additional space for well log on reverse side*)

I hereby swear or affirm, under the penalties for perjury that the information submitted herewith is to the best of my knowledge and belief, true, accurate and complete.

Signature of owner or authorized representative: T Mueller

Date: 9-9-97

RECORD OF WATER WELL

State Form 35680 (R4 / 4-92)

MW-3

Mail complete record within 30 days to:
INDIANA DEPARTMENT OF NATURAL RESOURCES
Division of Water
402 W.Washington St., Rm. W264
Indianapolis, IN 46204
(317) 232-4160

Fill in completely

WELL LOCATION

County where drilled	Civil township	Township	Range	Section
LAKE				

Driving directions to the well location (*include county road names, number, subdivision lot number with consideration to intersecting road and trip origination*). There is space for a map on reverse side.

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Name of building contractor:
Telephone number:

Address (*number and street, city, state, ZIP code*):

Name of drilling contractor: Rock & Soil Drilling Corporation
Telephone number: (630) 377-7190

Address (*number and street, city, state, ZIP code*): 1720 East Tyler Road, St. Charles, IL 60174

Name of equipment operator:
License number:
Date of completion:

CONSTRUCTION DETAILS

Use of well:
☐ Home ☐ Industry ☒ Test ☐ Irrigation
☐ Public supply ☐ Stock ☐ Other (*specify*)

Method of drilling:
☒ Rotary ☐ Jet ☐ Bucket rig
☐ Cable tool ☐ Rev. rotary ☐ Other

Casing length: 1 feet; Material: PVC (schedule 40); Diameter: 4 inches

Screen length: 10 feet; Material: PVC (schedule 40); Diameter: 4 inches

Screen slot size: .010; Total depth of well: 11 feet

Depth of pump setting: N/A; Water quality (*clear, cloudy, color, etc.*):

Type of pump: ☐ Submersible ☐ Shallow-well jet ☐ Deep-well jet ☐ Other (*specify*): N/A

WELL CAPACITY TEST

Check one: ☐ Bailing ☐ Air ☒ Pumping

Test rate: 3 gpm 1/4 hrs.

Drawdown: ~ 2 feet; Static level (*depth of water*) ~ 1.5 feet

GROUTING INFORMATION

Grout material	Depth of grout	Method of installation	Number of bags used
bentonite	From 0 to 1	gravity	two

WELL ABANDONMENT

Sealing material	Depth filled	Method of installation	Number of bags used
	From To		

WELL LOG

FORMATIONS: Type of material	From (*feet*)	To (*feet*)
SAND: fine to medium gr.	0	12

(*Additional space for well log on reverse side*)

I hereby swear or affirm, under the penalties for perjury that the information submitted herewith is to the best of my knowledge and belief, true, accurate and complete.

Signature of owner or authorized representative: T Mueller

Date: 9-9-97

RECORD OF WATER WELL

State Form 35680 (R4 / 4-92)

MW-1

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INDIANA DEPARTMENT OF NATURAL RESOURCES
Division of Water
402 W.Washington St., Rm. W264
Indianapolis, IN 46204
(317) 232-4160

Fill in completely

WELL LOCATION

County where drilled	Civil township	Township	Range	Section
LAKE				

Driving directions to the well location (*include county road names, number, subdivision lot number with consideration to intersecting road and trip origination*). There is space for a map on reverse side.

(see back side)

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Name of well owner: CITGO Petroleum Corporation — Telephone number: (847) 437-3463

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Address (*number and street, city, state, ZIP code*): 1720 East Tyler Road, St. Charles, IL 60174

Name of equipment operator — License number — Date of completion

CONSTRUCTION DETAILS

Use of well:
☐ Home ☐ Industry ☒ Test ☐ Irrigation
☐ Public supply ☐ Stock ☐ Other (*specify*):

Method of drilling:
☒ Rotary ☐ Jet ☐ Bucket rig
☐ Cable tool ☐ Rev. rotary ☐ Other

Casing length: 1 feet — Material: PVC (schedule 40) — Diameter: 4 inches

Screen length: 10 feet — Material: PVC (schedule 40) — Diameter: 4 inches

Screen slot size: .010 — Total depth of well: 11 feet

Depth of pump setting: N/A — Water quality (*clear, cloudy, odor, etc.*)

Type of pump: ☐ Submersible ☐ Shallow-well jet ☐ Deep-well jet ☐ Other (*specify*): N/A

WELL CAPACITY TEST

Check one: ☐ Bailing ☒ Pumping ☐ Air

Test rate: 3 gpm 1/4 hrs.

Drawdown: ~ 2 feet — Static level (*depth of water*): ~1.5 feet

GROUTING INFORMATION

Grout material	Depth of grout	Method of installation	Number of bags used
bentonite	From 0 to 1	gravity	two

WELL ABANDONMENT

Sealing material	Depth filled	Method of installation	Number of bags used
	From To		

WELL LOG

FORMATIONS: Type of material	From (*feet*)	To (*feet*)
SAND: fine to medium gr.	0	12

(Additional space for well log on reverse side)

I hereby swear or affirm, under the penalties for perjury that the information submitted herewith is to the best of my knowledge and belief, true, accurate and complete.

Signature of owner or authorized representative: T Mueller

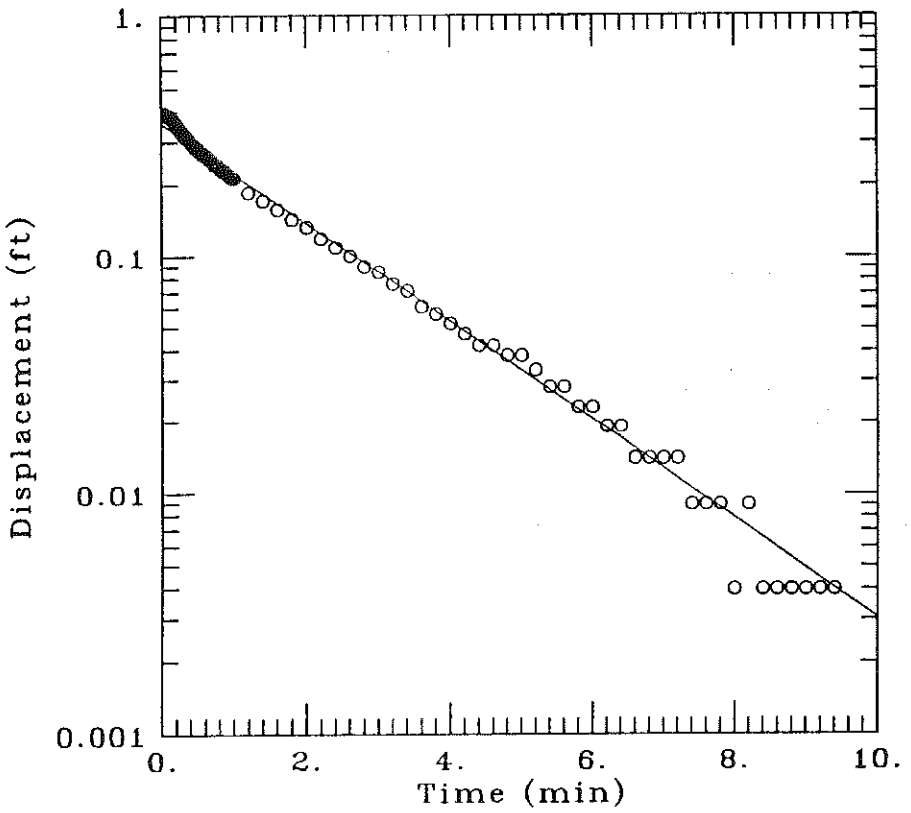
Date: 9-9-97

APPENDIX E

SLUG TEST RESULTS

Natural Resource Technology	Client: Citgo East Chicago Terminal
Project No.: 1195	Location: East Chicago, IN

MW-1



DATA SET:
mw1.dat
02/26/97

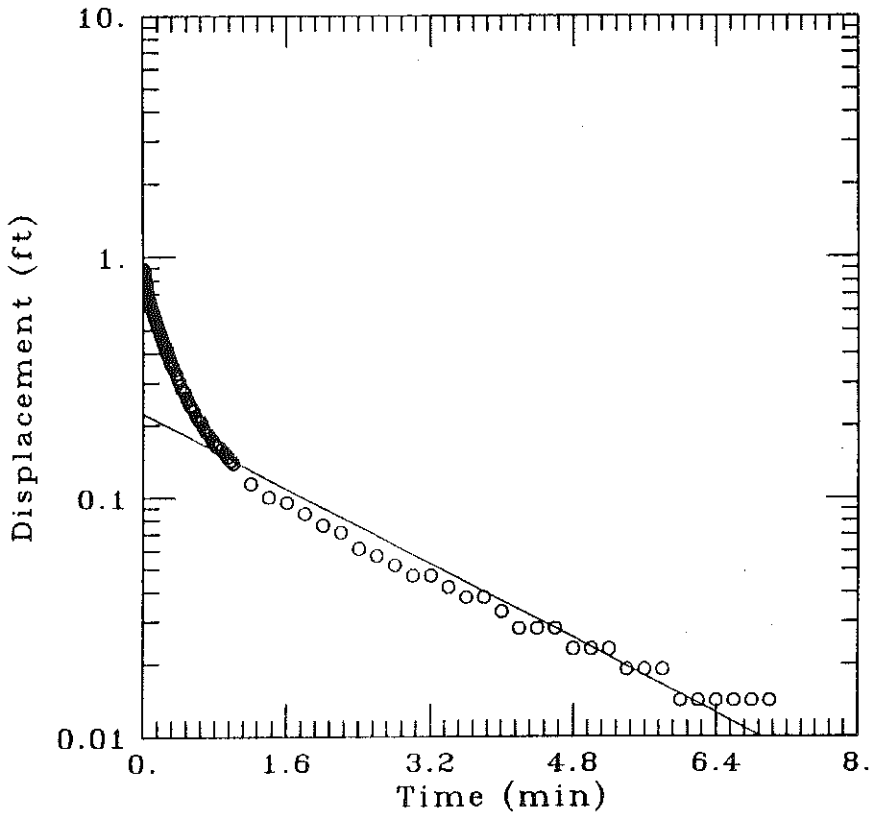
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST WELL:
MW-1
OBS. WELL:
MW-1

ESTIMATED PARAMETERS:
K = 0.00153 ft/min
y0 = 0.3579 ft

TEST DATA:
H0 = 0.395 ft
rc = 0.17 ft
rw = 0.42 ft
L = 10. ft
b = 10. ft
H = 9.5 ft

Natural Resource Technology	Client: Citgo East Chicago Terminal
Project No.: 1195	Location: East Chicago, IN

MW-2



DATA SET:
mw2.dat
02/26/97

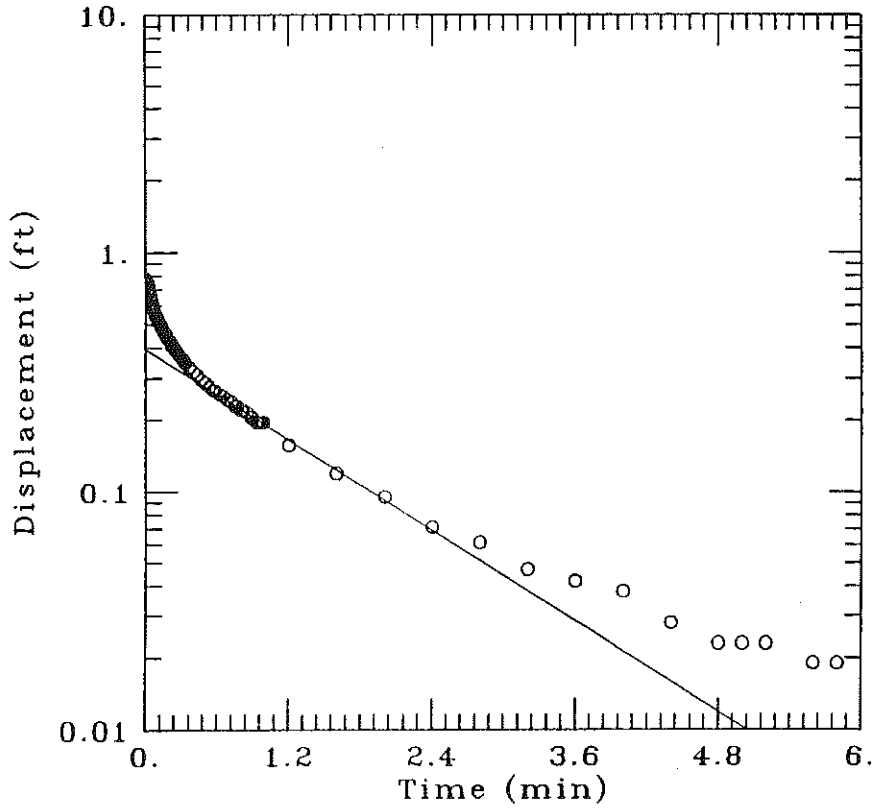
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST WELL:
MW-2
OBS. WELL:
MW-2

ESTIMATED PARAMETERS:
K = 0.001444 ft/min
y0 = 0.2225 ft

TEST DATA:
H0 = 0.891 ft
rc = 0.17 ft
rw = 0.42 ft
L = 10. ft
b = 10. ft
H = 9.5 ft

Natural Resource Technology	Client: Citgo East Chicago Terminal
Project No.: 1195	Location: East Chicago, IN

MW-3



DATA SET:
mw3.dat
02/26/97

AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST WELL:
MW-3
OBS. WELL:
MW-3

ESTIMATED PARAMETERS:
K = 0.002341 ft/min
y0 = 0.3958 ft

TEST DATA:
H0 = 0.776 ft
rc = 0.17 ft
rw = 0.42 ft
L = 10. ft
b = 10. ft
H = 9.5 ft

APPENDIX F

HYDRAULIC GRADIENT AND GROUNDWATER VELOCITY CALCULATIONS

CITGO E. Chicago IN
I.1
6-3-83

WESTON • SPER

Roy F. Weston, Inc.
Spill Prevention & Emergency Response Division

In Association with Jacobs Engineering Group Inc., Tetra Tech, Inc.
and ICF Incorporated

SITE INVESTIGATION AND STATUS REPORT
ASBESTOS CONTAMINATION
CITGO FACILITY
EAST CHICAGO, INDIANA

ROY F. WESTON
TECHNICAL ASSISTANCE TEAM
Region V

Prepared by
Kevin M. Pierard

3 June 1983

TDD NO. 5-8305-10
PCS NO. 1106

INTRODUCTION

On 18 May 1983 TAT was tasked to perform an inspection and review background information on the East Chicago/CITGO property. TAT member Kevin Pierard made the inspection on 26 May with OSC Pankanin. The CITGO facility is located in East Chicago, Indiana, on approximately 320 acres (Figure 1). The area of concern is an 80 acre site consisting of a partially dismantled, abandoned oil refinery.

HISTORY

CITGO began operations at the facility in the late 1920s; the refinery portion was shut down in 1972 and partially dismantled between 1976 and 1980 by Lloyd Hodges. This activity exposed asbestos-covered debris and released large quantities of free asbestos. On 20 August 1980, the USEPA filed a complaint under RCRA, regarding the asbestos problem, against Hodges and CITGO. After this, Hodges removed two piles (approximately 200 yd^3) of asbestos-laden material, then declared bankruptcy. There have been no subsequent cleanup activities at the site.

SAMPLING

Sampling at the site was completed on 21 September 1982 by the EPA. A total of 17 samples were taken, 15 of which contained between 3% and 22% asbestos (Attachment 1). None of the samples were taken where fibrous materials were not obvious.

SIZE HAZARDS

Due to the shape and small size of asbestos fibers, they may easily become airborne and remain so for long periods of time. There has been extensive documentation of the ability of airborne asbestos to cause cancer and lung damage through inhalation.

OSHA limits for employee asbestos exposure over an 8-hour period is 2 fibers, longer than 5 micrometers, per cubic centimeter of air. OSHA regulations set a ceiling concentration (one time exposure) limit at 10 fibers, longer than 5 micrometers, per cubic centimeter of air. The population within a one kilometer radius of the site is approximately 460, within 5 kilometers the population is 80,000.

EPA RECOMMENDATIONS

The most recent remedial response program (14 April 1983) submitted by Jim Pankanin of Remedial Response to Frank Biros of the office of Waste Programs Enforcement (OWPE) for review includes:

I. The demolition of all standing structures on the asbestos waste site that are covered with asbestos insulation materials, in accordance with applicable National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, 40 CFR Part 61, Subpart B, and specific requirements set forth below. In particular, care should be taken to adequately wet the material during the entire demolition period and not to work during high winds. Asbestos materials shall not be dropped or thrown to the ground. The removed material should be properly bagged, labeled and disposed of at a state-licensed landfill. Vehicles leaving the site should be washed before leaving. Onsite traffic patterns for the demolition equipment shall be developed and approved by EPA in advance to avoid movement of the vehicles or equipment over asbetos material already on the ground.

II. Visible deposits of asbestos insulation materials are currently scattered throughout the site. The program requires that all visible deposits of asbestos insulation materials and the associated contaminated soils be wetted, scraped up, bagged, labeled and properly disposed of at a state-licensed landfill. All dismantled piping which is coated with deteriorated asbestos insulation materials should be wetted and hauled to a central onsite location to be completely stripped of the asbestos material. The removed material should be properly bagged, labeled and disposed of at a state-licensed landfill. Salvageable piping should not be disposed with the asbestos wastes. None of these asbestos handling operations shall be conducted under windy conditions.

A plan for onsite traffic patterns shall be reviewed and approved by EPA prior to undertaking the asbestos cleanup activities. The purpose of the plan shall be to avoid disruption and migration of the asbestos materials from contaminated areas to areas of the site that have been cleaned of asbestos materials. EPA and its contractors shall be allowed access to the site during working hours in order to inspect all ongoing cleanup operations and to ensure that each area of the site is appropriately cleaned of asbestos insulation materials before installation of any cover material to that area.

III. After completion of the cleanup required in Section II and inspection by EPA or its contractors, each area of the asbestos waste site shall be covered with an appropriate compacted cover material at least six (6) inches deep. Covering and compaction operations shall be done over small plots in order to minimize site disruption. Each area should be wetted before covering to minimize dust production. At least six (6) inches of additional top soil shall then be applied to each area. The topsoil should be seeded and revegetated as soon as possible to prevent erosion by wind or rain.

Any areas left uncovered shall be sampled to ensure that no analytically detectable asbestos material exists in those areas. All analytical work

shall be performed utilizing polarizing light microscopy with a detectable limit of one percent (1%) asbestos in soils. A sampling protocol shall be developed and submitted to EPA which utilizes a grid system to statistically determine that no analytically detectable asbestos material remains in those areas.

IV. A notation shall be recorded on the deed to the site, or such other instrument which is normally examined in a title search, that will notify any potential purchaser of the property that the land has been contaminated with hazardous asbestos waste materials, and that any use of the site must not disturb the integrity of the final cover unless the Regional Administrator of U.S. EPA determines that adequate safety precautions will be implemented and that said disturbance will not increase the potential hazard to human health or the environment.

V. The following measures shall be taken, commencing immediately, and lasting for the duration of the remedial response program:

A. A penetrating sealant shall be applied to all exposed asbestos insulation remaining on the buildings and tanks, and the material on the ground shall be kept continuously wet. A spray system shall be installed to accomplish this end.

B. Access to the asbestos waste site shall be restricted to authorized persons only, by fencing or other means.

Notices shall be posted at all entry points warning that the site contains asbestos materials.

C. Persons entering the site shall be forewarned that the area contains asbestos materials, and such persons shall be advised in and given access to, the use of protective clothing, respirators and cleaning of all equipment used in the area.

D. All personnel, vehicles, machinery and equipment shall be decontaminated upon leaving the site.

VI. Continuous air monitoring must be performed both upwind and downwind around the perimeter of the active work site(s) whenever removal operations are underway. At least one sample from each air monitor shall be analyzed daily in accordance with OSHA-specified analytical procedures. Operations shall be curtailed whenever the air monitoring indicates asbestos levels above the following threshold limit values (TLV):

Amosite	0.5 fibers> 5 microns/cc
Chrysotile	2.0 fibers> 5 microns/cc
Crocidolite	0.2 fibers> 5 microns/cc
Other forms	2.0 fibers> 5 microns/cc

EPA shall be notified whenever these limits are exceeded. Operations shall not be restored until the source of the asbestos is investigated and the site is more completely wetted down.

VII. Actions described herein shall be performed in accordance with a detailed scope of work plan that must be approved by EPA. Notices shall be given to EPA prior to undertaking actions described in paragraphs I, II, or III above, and EPA or its contractors shall be permitted access to the site to oversee such actions and to split samples if requested.

This program has not been approved by the OWPE nor has it been given to CITGO.

CLEANUP COST ESTIMATE

The costs associated with the remedial response program are outlined below. Costs were obtained from correspondence dated 12 May 1983, from Pankanin to Neuberger of Regional Counsel. These costs do not include costs for demolition of existing structures.

A. Disposal of asbestos materials scattered throughout site:

1. Collect coated piping; wet and strip (4 man crew) ($17/hr) (8 hr/day) (10 days)	=	$ 5,440
(1 forklift + 1 truck) ($200/day) (10 days)	=	2,000
2. Manual cleanup of wetted asbestos throughout site (8 man crew) ($17/hr) (8 hr/day) (10 days)	=	10,880
(1 truck) ($100/day) (10 days)	=	1,000
3. Rent 20 sludge box -1 2 yd^3 rolls (20) ($150/day) (10 days)	=	30,000
4. Transportation and disposal (20 loads) ($50/load)	=	1,000
12 yd-3 load) (20 loads) ($17/$yd^3$)	=	4,080
		$54,400

B. Covering site with compacted cover material) (6" thickness)

$$80 \text{ acres} \times 43{,}560 \frac{\text{ft}^2}{\text{acre}} \times 0.5 \text{ ft} \frac{(1 \text{ yd}^3)}{(27 \text{ ft})}$$

$$= 64{,}533 \text{ yd}^3$$

$64,533 yd^3 clay x $3.00/$yd^3$ = $193,600

Deliver clay in 16 yd^3 loads ($50.00/load - 4,033 loads)	=	$201,650.00
60 loads/day - 67 days - 14 weeks		
Grade and compact soil during final eight (8) weeks using grader and bulldozer (to work in corners)		
Grader - 40 days x $40.00/hr x 8 hrs/day	=	$ 12,800.00
D6 (Dozer) - 40 days x $45,00/hr x 8 hr/day	=	14,400.00
		$422,450.00

C. Cover site with top soil and vegetate

1. A variety of cover materials can be used as long as it will support vegetation. Sandy loam materials can be combined with fly ash or slag.

Assume costs are lower than clay	=	$400,000.00
Vegetation	=	900.00
		$400,900.00

D. Personnel

2 heavy equipment operators ($28/hr) (8 hrs/day) (60 days) (2)	=	$ 26,880.00
Project supervisor ($35/hr) (8 hr/day) (60 days)	=	16,800.00
Technician ($17/hr) (8 hr/day) (60 days)	=	8,160.00
Safety equipment and monitoring ($30/man) (4 men) (60 days)	=	7,200.00
		$ 59,040.00

TOTAL	$935,890.00

CONCLUSIONS AND RECOMMENDATIONS

The company has recently shown an interest in resolving the asbestos problem and has in fact submitted a plan to the EPA for demolition of existing structures and disposal of waste containing asbestos. The company stated (at the 26 May inspection) that they hoped to begin this portion of the cleanup on 15 June and complete it before 1 December. The plan is being reviewed by the EPA to assure compliance under NESHAP regulations (40 CFR, Part 61 subparts A and B).

We feel that the actions being taken are in the best interests of all parties concerned. We do not believe the site represents an emergency at this time if the structures present on site are demolished and removed in compliance with all applicable NESHAP regulations.

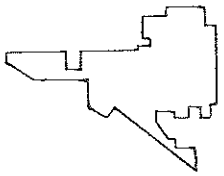
Covering of the site may be limited to small areas if the company handles asbestos materials carefully and removes soils which are obviously contaminated.

After this is completed, a comprehensive soil sampling program should be initiated to determine if soils in any other areas actually need to be removed or covered.

FIGURE 1

FIGURE 1

- - - - Citgo Facility Limit



Area of Concern

Whiting and Highland Quads

SCALE 1:24000

1 0 1 MILE

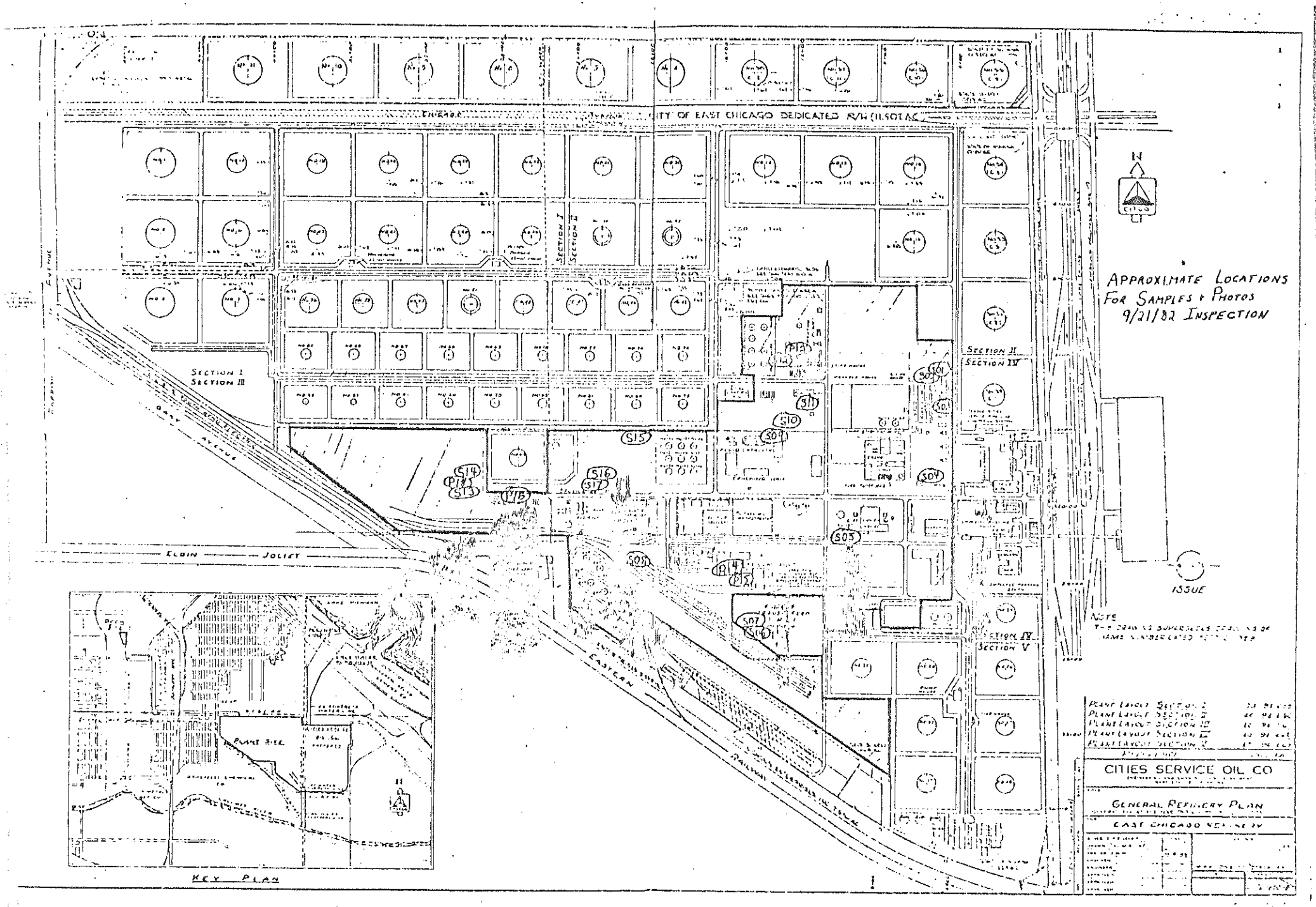
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

ATTACHMENT 1

CITIES SERVICE COMPANY, EAST CHICAGO, INDIANA
ASBESTOS SAMPLING AND INSPECTION

PICTURE NUMBER	TIME 9/21/82	SAMPLE NO. CG05	% ASBESTOS	ESTIMATED CUBIC FEET OF ASBESTOS	PICTURE LOCATION AND REMARKS	SAMPLE LOCATION
1	10:05 a.m.	S01	4	--	Debris near Alkalation Unit; facing West	Insulation debris on ground
2	10:06 a.m.	S02	6	--	Alkalation Unit tower; facing West	Inside of bottom of pipes sticking down
3	10:18 a.m.	S03	8	4.4	2 tanks 30' x 7' with 1/2" insulation West of Tank 59; facing West	Degraded insulation between tanks
4	10:25 a.m.	S04	7	--	Crude unit area; facing East	Upper surface of ground
5	10:37 a.m.	S05	None	--	Tank 196 & 197; facing North	Degrading insulation from side of tank
6	10:48 a.m.	S06	16	7.9	MGL battery coker piping; facing Northeast	Degrading insulation from pipe
7	10:52 a.m.	S07	3	1.1	MGL battery, asbestos paper <1/2" paper <1/2"	Degraded insulation from ground near MGL piping
8	11:00 a.m.	S08	22	--	Soil sample, 150' N.E. tank 15; facing North	Upper surface of ground
9	11:20 a.m.	S09	14	--	Bottom catylic cracker; facing West	Degrading insulation from pipe sticking down
10	11:25 a.m.	S10	4	--	Insulation pile N.E. cracking tower; facing West	Pile of degraded insulation
11	11:30 a.m.	S11	4	--	Pump & compressor house	Degrading insulation from pipe
12	11:38 a.m.	---	--	--	Bagged Asbestos	
13	11:42 a.m.	S12	11	--	Treating plant; facing East	Degrading insulation from bottom of pipe along tower
14	1:18 p.m.	---	--	--	Delay cooling unit, inside building	
15	1:20 p.m.	---	--	--	Weathered insulation	
16	1:30 p.m.	---	--	--	Catalytic cracker in background Painting tanks in foreground; facing E.	
17	1:37 p.m.	S13	6	0.74	80', 6" pipe, 1" insulation; WSN Tank 44; facing Northwest	Degrading insulation from pipe
18	1:40 p.m.	---	--	--	Weathered insulation	
19	1:45 p.m.	S14	5	0.75	Weathered insulation 3'x6'x0.5; facing North	Pile of degraded insulation
20	2:00 p.m.	S15	21	30.2	Desalter accumulator 50'x10'D, 1" insulation; facing Northwest	Degrading insulation from tank
21	2:13 p.m.	S16	<1	--	Fibered soil surface, SSW tank 80	
22	2:30 p.m.	S17	6	6.8	Tank 9'x19.6', 2" insulation; 200' SSW Tank 80; facing South	Degraded insulation from near tank


CITY OF EAST CHICAGO DEDICATED R/W (11.501 AC.)
SECTION I
SECTION III
SECTION II
SECTION IV
SECTION V
EAST CHICAGO AVENUE
ELGIN — JOLIET
EASTERN
RAILWAY
N
APPROXIMATE LOCATIONS FOR SAMPLES & PHOTOS 9/21/82 INSPECTION
ISSUE
NOTE
CITIES SERVICE OIL CO
GENERAL REFINERY PLAN
EAST CHICAGO REFINERY
KEY PLAN

SAFETY PLAN

WESTON SPER

Region V
Date 5-26-83
TDD# 5-8305-10

SAFETY PLAN

A. Incident Description

1. Location Citgo
P.O. Box 178
2500 East Chicago Ave.
East Chicago, In. 46312

2. Date 5-26-83

3. Type: Spill / / Fire / / HW Site / / Other Asbestos Site

4. Status Old Refinery

5. Response Objectives Determine if an emergency situation exists.

6. Background Review: Complete /XX/ Partial / /
If partial, why?

7. Hazard Level: High / / Moderate /X/ Low / / Unknown / /
Inhalation /XX/ Ingestion / / Contact / / External / /

8. Site Plan/Sketch Attached Yes / / No /XX/

9. Background Material attached Yes / / No /X/

B. Material Description

1. Type: Liquid / / Solid /X/ Sludge / / Vapor/Gas / /

2. Chemical Name/Class Asbestos (Amosite, Amphibole)

3. Characteristics: Corrosive / / Ignitable / / Volatile / /
Toxic /X/ Reactive / / Biological Agent / /

4. Toxicity: TLV _____ IDLH _____

5. Special Hazards _____

6. Acute Exposure Symptoms Shortness of breath of gradually increasing intensity and a dry cough.

SMG:ss
11/24/82

1 W RSW-396-1182

C. Site Description

1. Size 80 acres

2. Surrounding Population 460 within one Km.

3. Buildings/Homes

4. Topography Relatively flat

5. Receiving Waters Lake Michigan 1½ miles North

6. Weather 60° sunny

7. Unusual Features

8. Site History Site opened in the 1920's, refinery area closed in 1972 partially torn down between 1976 and 1980 releasing large quantities of asbestos.

D. Personnel Protection

1. Entry Level of Protective clothing : A / / B / / C /XX/ D / /

2. If not B, why? Contaminant did not warrant level B.

3. Site Instrument Readings:

% O2		% LEL	
Radioactivity		HNU	
OVA		Other	

4. Was protective level up or downgraded: Yes / / No /XX/
Up or Down graded to: A / / B / / C / / D / /
Why

Actual Change:

5. Respirator Protective Equipment:

SCBA			
Gas Mask	X	Canister Type	
Ultra Twin	X	Cartridge Type	GMD-H Combination
Dust Mask			

6. Protective Clothing:

Boot covers	Nitrile gloves	
Steel Toe Boots,	Hard Hats	
Tyvek suit	Ultra Twin	

7. Field Monitoring Equipment and Materials:

None

E. Decontamination Procedures

Remove disposable clothing, put clothing in plastic bag and dispose of on site.

1. Attach sketch showing Exclusion Zone, Contamination Reduction Zone, Support Zone and numerically labelled Decontamination Stations.

2. For each decontamination station note procedure and materials needed on an attachment page.

F. General Information

1. Team members

Kevin Pierard

2. Site Safety Coordinator Kevin Pierard

G. Emergency Information

1. Have nearby people been evacuated: Yes /_/ No /XXX
If yes ever how large an area

2. First Aid Instructions Remove disabled person to uncontaminated area and treat ailment.

3. Sources of help

	Name	Town	Phone	Notified Yes	Notified No
Fire		East Chicago	392-8307		No
Police		East Chicago	392 8420		No
Ambulance					
Hospital					
Poison Information					
Airport					
Heliport					
Site Telephone	Citgo	East Chicago	398-0734		
Nearest Telephone	Citgo	East Chicago	398-0734		

4. Emergency Telephone Numbers

WESTON Hot Line	215-524-1925 or 1926
WESTON NPO	215-431-0797 or 0798 or 692-3030
P. B. Lederman - NPM	201-665-0359 (Home)
S. M. Gertz - HSO	215-667-5461 (Home)
Medical Emergency	513-421-3063 (National Service)
EPA - ERT Emergency	201-321-6660
Chemtrec	800-424-9300
Central Disease Control	404-329-3311 (day) 404-329-3644 (night)
National Pesticide Medical Emergency	800-845-7633 (Regional Service)

Prepared by _____
Date 6-2-83

Approved by _____
Date 6-6-83

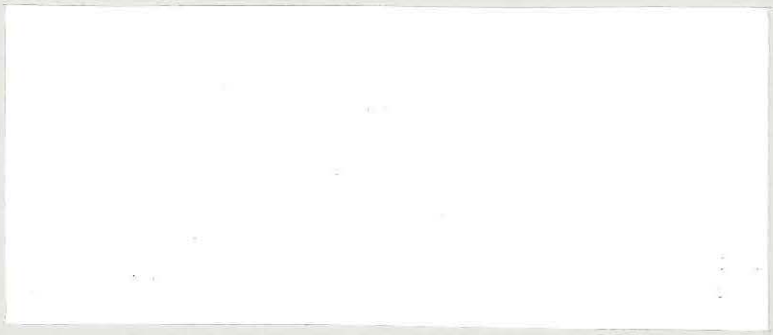
(For HSO Use Only)

Reviewed and Comments _____

Action Required? Yes / / No / / If yes, what action _____

Followup carried out? Date _____

_____ _____
S. O. Signature Date



Roy F. Weston, Inc.
Spill Prevention & Emergency Response Division

In Association with Jacobs Engineering Group Inc., Tetra Tech, Inc.
and ICF Incorporated

SITE INVESTIGATION AND STATUS REPORT
ASBESTOS CONTAMINATION
CITGO FACILITY
EAST CHICAGO, INDIANA

ROY F. WESTON
TECHNICAL ASSISTANCE TEAM
Region V

Prepared by
Kevin M. Pierard

3 June 1983

TDD NO. 5-8305-10
PCS NO. 1106

INTRODUCTION

On 18 May 1983 TAT was tasked to perform an inspection and review background information on the East Chicago/CITGO property. TAT member Kevin Pierard made the inspection on 26 May with OSC Pankanin. The CITGO facility is located in East Chicago, Indiana, on approximately 320 acres (Figure 1). The area of concern is an 80 acre site consisting of a partially dismantled, abandoned oil refinery.

HISTORY

CITGO began operations at the facility in the late 1920s; the refinery portion was shut down in 1972 and partially dismantled between 1976 and 1980 by Lloyd Hodges. This activity exposed asbestos-covered debris and released large quantities of free asbestos. On 20 August 1980, the USEPA filed a complaint under RCRA, regarding the asbestos problem, against Hodges and CITGO. After this, Hodges removed two piles (approximately 200 yd^3) of asbestos-laden material, then declared bankruptcy. There have been no subsequent cleanup activities at the site.

SAMPLING

Sampling at the site was completed on 21 September 1982 by the EPA. A total of 17 samples were taken, 15 of which contained between 3% and 22% asbestos (Attachment 1). None of the samples were taken where fibrous materials were not obvious.

SIZE HAZARDS

Due to the shape and small size of asbestos fibers, they may easily become airborne and remain so for long periods of time. There has been extensive documentation of the ability of airborne asbestos to cause cancer and lung damage through inhalation.

OSHA limits for employee asbestos exposure over an 8-hour period is 2 fibers, longer than 5 micrometers, per cubic centimeter of air. OSHA regulations set a ceiling concentration (one time exposure) limit at 10 fibers, longer than 5 micrometers, per cubic centimeter of air. The population within a one kilometer radius of the site is approximately 460, within 5 kilometers the population is 80,000.

EPA RECOMMENDATIONS

The most recent remedial response program (14 April 1983) submitted by Jim Pankanin of Remedial Response to Frank Biros of the office of Waste Programs Enforcement (OWPE) for review includes:

I. The demolition of all standing structures on the asbestos waste site that are covered with asbestos insulation materials, in accordance with applicable National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, 40 CFR Part 61, Subpart B, and specific requirements set forth below. In particular, care should be taken to adequately wet the material during the entire demolition period and not to work during high winds. Asbestos materials shall not be dropped or thrown to the ground. The removed material should be properly bagged, labeled and disposed of at a state-licensed landfill. Vehicles leaving the site should be washed before leaving. Onsite traffic patterns for the demolition equipment shall be developed and approved by EPA in advance to avoid movement of the vehicles or equipment over asbetos material already on the ground.

II. Visible deposits of asbestos insulation materials are currently scattered throughout the site. The program requires that all visible deposits of asbestos insulation materials and the associated contaminated soils be wetted, scraped up, bagged, labeled and properly disposed of at a state-licensed landfill. All dismantled piping which is coated with deteriorated asbestos insulation materials should be wetted and hauled to a central onsite location to be completely stripped of the asbestos material. The removed material should be properly bagged, labeled and disposed of at a state-licensed landfill. Salvageable piping should not be disposed with the asbestos wastes. None of these asbestos handling operations shall be conducted under windy conditions.

A plan for onsite traffic patterns shall be reviewed and approved by EPA prior to undertaking the asbestos cleanup activities. The purpose of the plan shall be to avoid disruption and migration of the asbestos materials from contaminated areas to areas of the site that have been cleaned of asbestos materials. EPA and its contractors shall be allowed access to the site during working hours in order to inspect all ongoing cleanup operations and to ensure that each area of the site is appropriately cleaned of asbestos insulation materials before installation of any cover material to that area.

III. After completion of the cleanup required in Section II and inspection by EPA or its contractors, each area of the asbestos waste site shall be covered with an appropriate compacted cover material at least six (6) inches deep. Covering and compaction operations shall be done over small plots in order to minimize site disruption. Each area should be wetted before covering to minimize dust production. At least six (6) inches of additional top soil shall then be applied to each area. The topsoil should be seeded and revegetated as soon as possible to prevent erosion by wind or rain.

Any areas left uncovered shall be sampled to ensure that no analytically detectable asbestos material exists in those areas. All analytical work

shall be performed utilizing polarizing light microscopy with a detectable limit of one percent (1%) asbestos in soils. A sampling protocol shall be developed and submitted to EPA which utilizes a grid system to statistically determine that no analytically detectable asbestos material remains in those areas.

IV. A notation shall be recorded on the deed to the site, or such other instrument which is normally examined in a title search, that will notify any potential purchaser of the property that the land has been contaminated with hazardous asbestos waste materials, and that any use of the site must not disturb the integrity of the final cover unless the Regional Administrator of U.S. EPA determines that adequate safety precautions will be implemented and that said disturbance will not increase the potential hazard to human health or the environment.

V. The following measures shall be taken, commencing immediately, and lasting for the duration of the remedial response program:

A. A penetrating sealant shall be applied to all exposed asbestos insulation remaining on the buildings and tanks, and the material on the ground shall be kept continuously wet. A spray system shall be installed to accomplish this end.

B. Access to the asbestos waste site shall be restricted to authorized persons only, by fencing or other means.

Notices shall be posted at all entry points warning that the site contains asbestos materials.

C. Persons entering the site shall be forewarned that the area contains asbestos materials, and such persons shall be advised in and given access to, the use of protective clothing, respirators and cleaning of all equipment used in the area.

D. All personnel, vehicles, machinery and equipment shall be decontaminated upon leaving the site.

VI. Continuous air monitoring must be performed both upwind and downwind around the perimeter of the active work site(s) whenever removal operations are underway. At least one sample from each air monitor shall be analyzed daily in accordance with OSHA-specified analytical procedures. Operations shall be curtailed whenever the air monitoring indicates asbestos levels above the following threshold limit values (TLV):

Amosite	0.5 fibers> 5 microns/cc
Chrysotile	2.0 fibers> 5 microns/cc
Crocidolite	0.2 fibers> 5 microns/cc
Other forms	2.0 fibers> 5 microns/cc

EPA shall be notified whenever these limits are exceeded. Operations shall not be restored until the source of the asbestos is investigated and the site is more completely wetted down.

VII. Actions described herein shall be performed in accordance with a detailed scope of work plan that must be approved by EPA. Notices shall be given to EPA prior to undertaking actions described in paragraphs I, II, or III above, and EPA or its contractors shall be permitted access to the site to oversee such actions and to split samples if requested.

This program has not been approved by the OWPE nor has it been given to CITGO.

CLEANUP COST ESTIMATE

The costs associated with the remedial response program are outlined below. Costs were obtained from correspondence dated 12 May 1983, from Pankanin to Neuberger of Regional Counsel. These costs do not include costs for demolition of existing structures.

A. Disposal of asbestos materials scattered throughout site:

1. Collect coated piping; wet and strip (4 man crew) ($17/hr) (8 hr/day) (10 days)	=	$ 5,440
(1 forklift + 1 truck) ($200/day) (10 days)	=	2,000
2. Manual cleanup of wetted asbestos throughout site (8 man crew) ($17/hr) (8 hr/day) (10 days)	=	10,880
(1 truck) ($100/day) (10 days)	=	1,000
3. Rent 20 sludge box -1 2 yd^3 rolls (20) ($150/day) (10 days)	=	30,000
4. Transportation and disposal (20 loads) ($50/load)	=	1,000
12 yd-3 load) (20 loads) ($17/$yd^3$)	=	4,080
		$54,400

B. Covering site with compacted cover material) (6" thickness)

$$80 \text{ acres} \times 43{,}560 \frac{\text{ft}^2}{\text{acre}} \times 0.5 \text{ ft} \frac{(1 \text{ yd}^3)}{(27 \text{ ft})}$$

$$= 64{,}533 \text{ yd}^3$$

64,533 yd^3 clay x $3.00/$yd^3$ = $193,600

Deliver clay in 16 yd^3 loads ($50.00/load - 4,033 loads)	=	$201,650.00

60 loads/day - 67 days - 14 weeks

Grade and compact soil during final eight (8) weeks using grader and bulldozer (to work in corners)

Grader - 40 days x $40.00/hr x 8 hrs/day	=	$ 12,800.00
D6 (Dozer) - 40 days x $45,00/hr x 8 hr/day	=	14,400.00
		$422,450.00

C. Cover site with top soil and vegetate

1. A variety of cover materials can be used as long as it will support vegetation. Sandy loam materials can be combined with fly ash or slag.

Assume costs are lower than clay	=	$400,000.00
Vegetation	=	900.00
		$400,900.00

D. Personnel

2 heavy equipment operators ($28/hr) (8 hrs/day) (60 days) (2)	=	$ 26,880.00
Project supervisor ($35/hr) (8 hr/day) (60 days)	=	16,800.00
Technician ($17/hr) (8 hr/day) (60 days)	=	8,160.00
Safety equipment and monitoring ($30/man) (4 men) (60 days)	=	7,200.00
		$ 59,040.00

TOTAL	$935,890.00

CONCLUSIONS AND RECOMMENDATIONS

The company has recently shown an interest in resolving the asbestos problem and has in fact submitted a plan to the EPA for demolition of existing structures and disposal of waste containing asbestos. The company stated (at the 26 May inspection) that they hoped to begin this portion of the cleanup on 15 June and complete it before 1 December. The plan is being reviewed by the EPA to assure compliance under NESHAP regulations (40 CFR, Part 61 subparts A and B).

We feel that the actions being taken are in the best interests of all parties concerned. We do not believe the site represents an emergency at this time if the structures present on site are demolished and removed in compliance with all applicable NESHAP regulations.

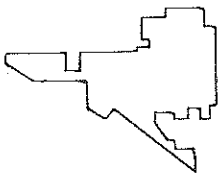
Covering of the site may be limited to small areas if the company handles asbestos materials carefully and removes soils which are obviously contaminated.

After this is completed, a comprehensive soil sampling program should be initiated to determine if soils in any other areas actually need to be removed or covered.

FIGURE 1

FIGURE 1

- - - - Citgo Facility Limit



Area of Concern

Whiting and Highland Quads

SCALE 1:24000

1 0 1 MILE

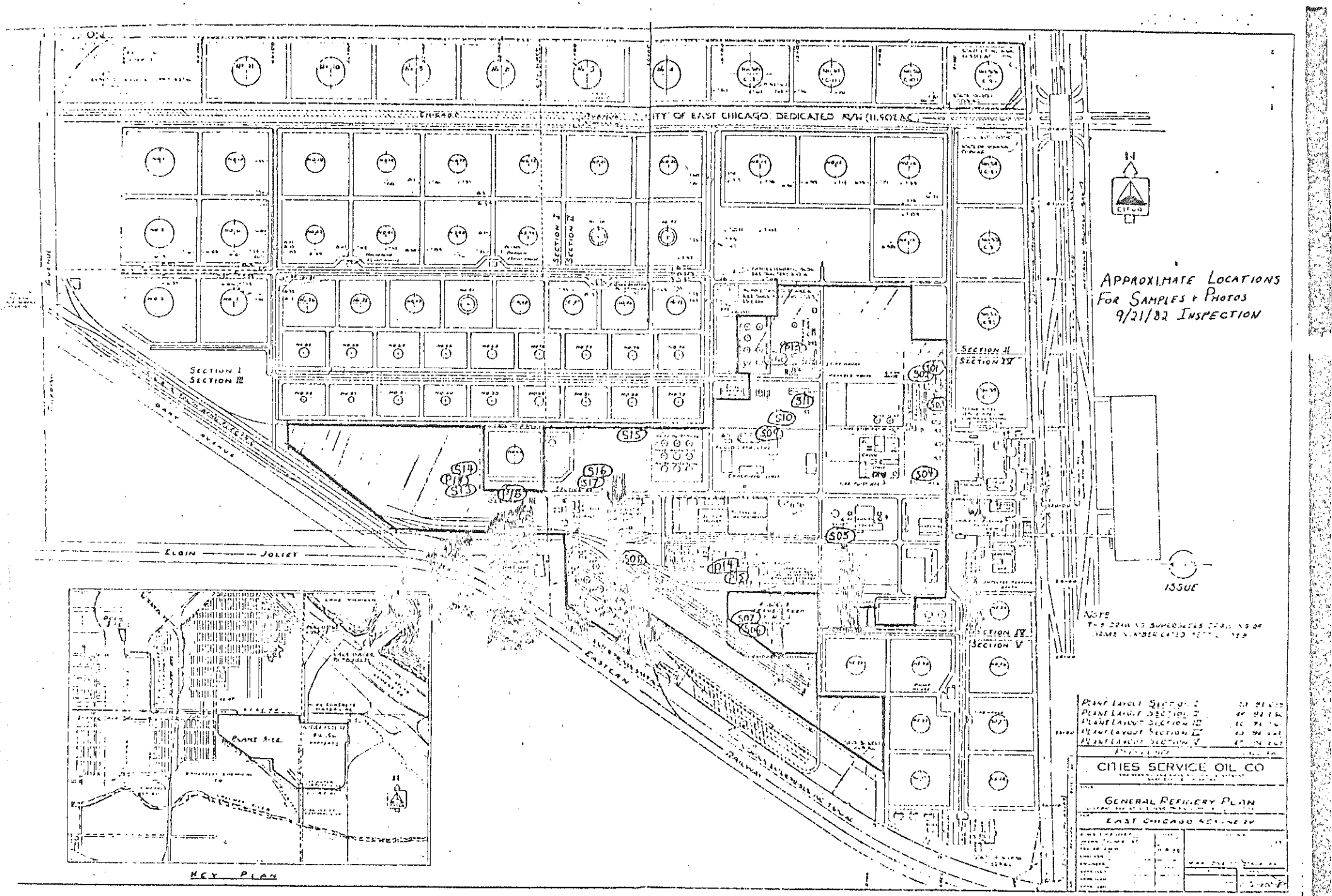
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

ATTACHMENT 1

CITIES SERVICE COMPANY, EAST CHICAGO, INDIANA
ASBESTOS SAMPLING AND INSPECTION

PICTURE NUMBER	TIME 9/21/82	SAMPLE NO. CG05	% ASBESTOS	ESTIMATED CUBIC FEET OF ASBESTOS	PICTURE LOCATION AND REMARKS	SAMPLE LOCATION
1	10:05 a.m.	S01	4	--	Debris near Alkalation Unit; facing West	Insulation debris on ground
2	10:06 a.m.	S02	6	--	Alkalation Unit tower; facing West	Inside of bottom of pipes sticking down
3	10:18 a.m.	S03	8	4.4	2 tanks 30' x 7' with 1/2" insulation West of Tank 59; facing West	Degraded insulation between tanks
4	10:25 a.m.	S04	7	--	Crude unit area; facing East	Upper surface of ground
5	10:37 a.m.	S05	None	--	Tank 196 & 197; facing North	Degrading insulation from side of tank
6	10:48 a.m.	S06	16	7.9	MGL battery coker piping; facing Northeast	Degrading insulation from pipe
7	10:52 a.m.	S07	3	1.1	MGL battery, asbestos paper <1/2" paper <1/2"	Degraded insulation from ground near MGL piping
8	11:00 a.m.	S08	22	--	Soil sample, 150' N.E. tank 15; facing North	Upper surface of ground
9	11:20 a.m.	S09	14	--	Bottom catylic cracker; facing West	Degrading insulation from pipe sticking down
10	11:25 a.m.	S10	4	--	Insulation pile N.E. cracking tower; facing West	Pile of degraded insulation
11	11:30 a.m.	S11	4	--	Pump & compressor house	Degrading insulation from pipe
12	11:38 a.m.	---	--	--	Bagged Asbestos	
13	11:42 a.m.	S12	11	--	Treating plant; facing East	Degrading insulation from bottom of pipe along tower
14	1:18 p.m.	---	--	--	Delay cooling unit, inside building	
15	1:20 p.m.	---	--	--	Weathered insulation	
16	1:30 p.m.	---	--	--	Catalytic cracker in background Painting tanks in foreground; facing E.	
17	1:37 p.m.	S13	6	0.74	80', 6" pipe, 1" insulation; WSN Tank 44; facing Northwest	Degrading insulation from pipe
18	1:40 p.m.	---	--	--	Weathered insulation	
19	1:45 p.m.	S14	5	0.75	Weathered insulation 3'x6'x0.5; facing North	Pile of degraded insulation
20	2:00 p.m.	S15	21	30.2	Desalter accumulator 50'x10'D, 1" insulation; facing Northwest	Degrading insulation from tank
21	2:13 p.m.	S16	<1	--	Fibered soil surface, SSW tank 80	
22	2:30 p.m.	S17	6	6.8	Tank 9'x19.6', 2" insulation; 200' SSW Tank 80; facing South	Degraded insulation from near tank


APPROXIMATE LOCATIONS
FOR SAMPLES & PHOTOS
9/21/82 INSPECTION
N
ISSUE
NOTE
CITIES SERVICE OIL CO
GENERAL REFINERY PLAN
EAST CHICAGO
KEY PLAN
ELGIN
JOLIET
EASTERN
SECTION I
SECTION III
SECTION II
SECTION IV
SECTION V

SAFETY PLAN

WESTON SPER

Region V
Date 5-26-83
TDD# 5-8305-10

SAFETY PLAN

A. Incident Description

1. Location Citgo
P.O. Box 178
2500 East Chicago Ave.
East Chicago, In. 46312

2. Date 5-26-83

3. Type: Spill / / Fire / / HW Site / / Other Asbestos Site

4. Status Old Refinery

5. Response Objectives Determine if an emergency situation exists.

6. Background Review: Complete /XX/ Partial / /
If partial, why?

7. Hazard Level: High / / Moderate /X/ Low / / Unknown / /
Inhalation /XX/ Ingestion / / Contact / / External / /

8. Site Plan/Sketch Attached Yes / / No /XX/

9. Background Material attached Yes / / No /X/

B. Material Description

1. Type: Liquid / / Solid /X/ Sludge / / Vapor/Gas / /

2. Chemical Name/Class Asbestos (Amosite, Amphibole)

3. Characteristics: Corrosive / / Ignitable / / Volatile / /
Toxic /X/ Reactive / / Biological Agent / /

4. Toxicity: TLV _____ IDLH _____

5. Special Hazards _____

6. Acute Exposure Symptoms Shortness of breath of gradually increasing intensity and a dry cough.

SMG:ss
11/24/82

W RSW-396-1182

C. Site Description

1. Size 80 acres

2. Surrounding Population 460 within one Km.

3. Buildings/Homes

4. Topography Relatively flat

5. Receiving Waters Lake Michigan 1½ miles North

6. Weather 60° sunny

7. Unusual Features

8. Site History Site opened in the 1920's, refinery area closed in 1972 partially torn down between 1976 and 1980 releasing large quantities of asbestos.

D. Personnel Protection

1. Entry Level of Protective clothing : A / / B / / C /XX/ D / /

2. If not B, why? Contaminant did not warrant level B.

3. Site Instrument Readings:

% O2	% LEL
Radioactivity	HNU
OVA	Other

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Up or Down graded to: A / / B / / C / / D / /
Why

Actual Change:

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Dust Mask	

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Tyvek suite	Ultra Twin	

7. Field Monitoring Equipment and Materials:

None

E. Decontamination Procedures

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1. Attach sketch showing Exclusion Zone, Contamination Reduction Zone, Support Zone and numerically labelled Decontamination Stations.

2. For each decontamination station note procedure and materials needed on an attachment page.

F. General Information

1. Team members

Kevin Pierard

2. Site Safety Coordinator Kevin Pierard

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If yes ever how large an area

2. First Aid Instructions Remove disabled person to uncontaminated area and treat ailment.

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Heliport					
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P. B. Lederman - NPM	[redacted] ([redacted] (Home)
S. M. Gertz - HSO	[redacted] (Home)
Medical Emergency	513-421-3063 (National Service)
EPA - ERT Emergency	201-321-6660
Chemtrec	800-424-9300
Central Disease Control	404-329-3311 (day) 404-329-3644 (night)
National Pesticide	800-845-7633
Medical Emergency	(Regional Service)

Prepared by [signature]
Date 6-2-83

Approved by [signature]
Date 6-6-83

(For HSO Use Only)

Reviewed and Comments _____

Action Required? Yes [ ] No [ ] If yes, what action _____

Followup carried out? Date _____

_____ _____
S. O. Signature Date

1. COST CENTER: V	ACKNOWLEDGEMENT OF COMPLETION FOR TDD TAT EMERGENCY RESPONSE, REMOVAL AND PREVENTION ROY F. WESTON, INC.	2. NO.: 5-8305-10 ☒ COMPLETE ☐ INTERIM

3. RESPONSE: Enclosed please find the report on our investigation of the CITGO (Hodges) facility in East Chicago, Indiana.

☒ FORMAL REPORT
☐ LETTER REPORT
☐ FORMAL BRIEFIN
☐ OTHER (SPECIFY

3A. ACTUAL TOTAL COST:	3B. ACTUAL TOTAL HOURS:

4. DPO ACTION: ☐ ACCEPTED ☐ ACCEPTED WITH EXCEPTIONS ☐ REJECTED

5. COMMENTS:

6. I CERTIFY THAT THE ATTACHED MATERIALS MEET AND COMPLY WITH ALL REQUIREMENTS OF THE SUBJECT TDD.

(TATL SIGNATURE)

7. DATE: 6/3/83

8. I ACKNOWLEDGE THAT I HAVE BEEN PROVIDED WITH THE MATERIALS AND SERVICES SPECIFIED IN THE SUBJECT TDD WITHIN ITS ORIGINAL OR REVISED TIME FRAMES.

(AUTHORIZING DPO SIGNATURE)

9. DATE: 6/3/83

Sheet 1 White — TATL Copy
Sheet 2 Green — DPO Copy (Signed by TATL, Replaces Original)
Sheet 3 Canary — NPMO Copy
Sheet 4 Pink — Project Officer Copy
Sheet 5 Goldenrod — DPO Original (Unsigned by TATL)
☐ Photocopy to Contracting Officer (Washington, D.C.)